

Air Quality 1987 Recommendations/2007 Results

By Don R. Willard, Director
Mecklenburg County Air Quality

The 1987 Mecklenburg County State of the Environment Report listed as its number-one, high-priority issue: "ozone non-attainment affecting the health and economy of Mecklenburg County." Poor air quality affects us all directly as well as the regional economy.

In 2007, it remains a high priority environmental issue. The 1987 report identified a number of air quality issues and recommendations that were grouped into four main areas: National Ambient Air Quality Standards (NAAQS), Air Toxics, Indoor Air Pollution and Solid Waste Incineration. Following is a brief description of each issue from the report, the recommendations and a commentary on the current status of the issues and recommendations.

National Ambient Air Quality Standards (NAAQS)

"There is no doubt that Mecklenburg County is currently facing a serious problem with ozone levels." (SOER 1987)

1987 Recommendations:

- Support the current Vehicle Inspection/Maintenance program.
- Support legislative action to amend the Vehicle Inspection/Maintenance program to include hydrocarbon emissions, which contribute to the ozone problem.
- Expand the Vehicle Inspection/Maintenance program to include non-Mecklenburg County commuter vehicles.
- Plan for roads that will handle increased numbers of vehicles and increased traffic, thereby alleviating congested traffic as a contributor to carbon monoxide and hydrocarbon emissions.
- Improve and expand public transportation to make it more attractive and available to

commuters, thereby decreasing air pollution emissions.

- Support a regional approach to improve air quality by promoting stationary and transportation control strategies for the counties surrounding Mecklenburg County which comprise the Metropolitan Statistical Area (MSA) and which influence ozone levels in Mecklenburg County.
- Support control strategies for currently unregulated stationary sources.
- Support additional resources to implement SIP revisions.

2007 Status:

- Mecklenburg County still has a serious problem with ozone and does not comply with national standards.
- Vehicle Inspection/Maintenance (I/M) programs for automobiles have been expanded to 48 counties in NC. I/M programs have not been implemented in SC.
- Roads and public transportation have expanded but it is hard to assess the overall positive impact on air quality given the overall growth of the region, increase in population and vehicle miles traveled since 1987.
- Mecklenburg County and the surrounding counties are all now designated non-attainment for ozone thereby applying the same air pollution control rules and programs to stationary and mobile sources throughout the region. There is no "regional" air quality organization.
- Authority to charge fees as a result of the 1990 Clean Air Act amendments as well as other funding sources has provided additional resources to implement air quality programs.



Air Toxics

The first of three issues identified that will be facing Mecklenburg County in the near future.

“... toxic air pollutants... substances that pose a significant health risk to humans and for which no national standards have been set.” (SOER 1987)

1987 Recommendations:

- Coordinate the development, enactment and operation of an air toxics program as part of the Air Quality Section of the Mecklenburg County Department of Environmental Protection.
- Support the employment of qualified personnel to develop modeling programs specific to Mecklenburg County sources. As of 1987, an air toxics coordinator had been hired and a position for an air toxics modeler had been approved.

2007 Status:

- Hazardous and toxic air pollutant based programs (HAPs and TAPs) have been enacted at the federal, state and local levels (HAPS – 188 pollutants, TAPS – 105 pollutants). Neither program sets ambient standards.
- Maximum Available Control Technology (MACT) and Generally Available Control Technology (GACT) are technology based federal programs for new air pollution sources.
- The North Carolina TAP rule ensures that regulated point sources that increase their air emissions do not increase the public's lifetime cancer risk by one in a million.
- Mecklenburg County employs adequate staff to evaluate and permit regulated toxic and hazardous air pollutants from stationary sources.

Indoor Air Pollution

“The second area that is rapidly becoming an issue is that of indoor air quality.” (SOER 1987)

1987 Recommendations:

- Continue the clean-up of outdoor air. Unless filtration is employed, indoor air cannot be cleaner than that found in the surrounding atmosphere.
- Accurately define the scope of the problem in Mecklenburg County by a survey of existing structures. We cannot efficiently deal with the problem until the full extent is known.
- Begin extensive public education. Those who are tightening their homes and offices to save on energy costs are employing alternative means of heating and are bringing synthetic substances into their environment. The need to be alerted to the potential problems so that they can correct existing problems and avoid new ones. Increased education will act in concert with increased public awareness to spur proper regulation of the indoor environment.
- Begin monitoring of heating, ventilating and air conditioning systems in public buildings. The inspections could be much the same as present health department inspections of restaurants. The major cause of indoor air problems is poorly maintained heating, ventilating and air conditioning systems that promote the growth of fungi, bacteria and other microorganisms. These present a real and present danger to the public health and must be dealt with strictly.
- Strengthen the present building code and employ the most recent standards of the

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American Society of Heating, Refrigerating and Air Conditioning Engineers. This may not cure existing buildings, but it can ensure that the tremendous building boom will produce buildings that can be used and enjoyed by our citizens. These standards insure that adequate ventilation is present in a building which is the best way to cure poor indoor air quality.

2007 Status:

- Indoor air pollution continues to be an important issue; however environmental regulatory agencies (e.g., USEPA) have addressed this issue mainly through education not regulation. Monitoring HVAC systems and revisions to building codes were not pursued by the local environmental regulatory agency.
- Mold and mildew is the number one complaint in Mecklenburg County.
- Radon, an indoor air pollutant, has been determined through testing not to be a problem in Mecklenburg County.
- The removal of asbestos through the demolition and renovation process continues to flourish in Mecklenburg County but is considered to be adequately regulated.
- The removal of lead based paint is also regulated locally during the permit process.

Solid Waste Incineration

"A third issue soon to demand the attention is that of waste incineration." (SOER 1987)

1987 Recommendations:

- Support enactment of regulations requiring continuous emission monitoring and Best Available Control Technology to control air emissions from all waste incinerators.
- Support a strong, integrated regulatory system to gain community confidence and support for waste incineration.
- Establish appropriate siting restrictions for all future incinerators.
- Develop regulations dealing with transportation of infectious wastes.
- Develop a licensing and inspection system for monitoring of infectious waste haulers.

2007 Status:

- Solid waste incineration has been adequately regulated at the national, state and local level.
- In 2007, one medical waste incinerator operated in Mecklenburg County.

Ambient air quality has improved overall. Ozone concentrations are not as high and days over national standards are not as many. Industrial controls for large industrial sources of air pollution (primarily coal-fired power plants) have been effective. Cars, trucks and construction equipment are less polluting per unit.

The public's awareness of our air quality situation has been heightened. However, 20 years later we still violate the national standard for ozone and barely meet the particulate matter standard. The region's population growth and our reliance on single occupancy vehicles as our primary mode of transportation are the main reasons. Meeting the current ozone standard and then the proposed new lower standard will require more from all of us, if we wish to breathe healthy air year 'round.

Air Quality: Findings and Recommendations 2008

By Don R. Willard, Director, Mecklenburg County Air Quality

Ozone pollution continues to contribute to poor air quality in Mecklenburg County. The current ozone eight hour ozone standard is 0.08 ppm (< 0.085 ppm). In 2007, the design value measured in the Mecklenburg County monitoring network was 0.093 ppm. This is the highest design value determined since the 2004 designation year. Mecklenburg County experienced 19 days when the ozone NAAQS was exceeded in 2007, the most days measured above the eight-hour standard since 2002. Concentration values measured in 2007 were higher than those measured in each of the past four years. Compliance is required by June 15, 2010. The state Implementation Plan (SIP) for ozone for this region submitted to USEPA by the North Carolina Division of Air Quality projects that we will meet the eight hour ozone standard although the margin of error is small. 2007 ozone values make the probability of attainment by 2010 less likely. Moreover, USEPA has proposed to lower the ozone standard farther in 2008.

Particulate matter also contributes to poor air quality in Mecklenburg County. The concentration measurement used to determine compliance with the 24-hour PM_{2.5} standard in 2006 was 32 µg/m³, just below the 24-hour standard of 35 µg/m³. The annual compliance value for 2006 was 14.9 µg/m³. For 2007, particulate matter concentrations continue to measure just under the annual health-based standard of 15.0 µg/m³.

Many new pollution reduction efforts at the federal, state, and local levels are focused on highway and off road vehicles. Latest calculated estimates show that mobile sources account for 66 percent of volatile organic compound (VOC) and 92 percent of nitrogen oxide emissions (NO_x) in Mecklenburg County.

The current transportation and land use planning efforts in Mecklenburg County are consistent with nationally recognized strategies to connect transportation, land use and air quality.

Greenhouse gas emissions have become a national and international environmental issue, which is expected to translate into the need for local action in future years.

Reduce locally generated air emissions, particularly mobile source emissions including non-road construction equipment. Federal and state regulations will compel needed reductions over time. Local action is needed now if we want ensure attainment of the ozone standard and the annual particulate matter standard. Actions by business, industry, government and individuals relative to reducing per capita vehicle miles traveled, managing energy demand and making "greener" purchasing decisions must be a part of our local solution to improving our air quality.

Promote land development that reduces vehicle miles of travel and continue to support alternative forms of transportation, including mass transit.

Identify sources and amounts of locally generated greenhouse gases and encourage and promote measures that increase energy efficiency and promote energy conservation thereby reducing greenhouse gas emissions.

State of the Environment Report - 2008 Air Quality Environmental Indicators

	2007	1987
Air Quality Index Designations		
Good (Green)	189	N/A
Moderate (Yellow Days)	157	N/A
Unhealthy for Sensitive Groups (Orange Days)	17	N/A
Unhealthy (Red Days)	1	N/A
Very Unhealthy (Purple Days)	1	N/A

N/A - The color codes were not used to designate air quality at this time.

Days Over the Ambient Standard		
Ozone: 1-hour	2	7
Ozone: 8-hour	19	36
Carbon Monoxide	0	0
Particulate Matter -Total Suspended (TSP)	N/A	0
Particulate Matter < 10 microns (PM ₁₀)	0	N/A
Particulate Matter < 2.5 microns (PM _{2.5})	4	N/A
Nitrogen Oxide	0	0
Sulfur Dioxide	0	0

N/A indicates pollutants not monitored at that time.

Permitted Facilities		
Major	12	91
Minor	212	115
NESHAP/MACT	20	5
Stage I	329	N/A

N/A - not regulated

Mobile Source Activity		
Registered Vehicles	640,282	376,964
Vehicle Miles Traveled per Day	29,950,013	11,000,000
Mass Transit Daily Ridership	73,102	36,623

Air Quality Violations	107	87
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Activity Levels		
Citizen Requests for Service	154	630
NESHAP Notifications ("Asbestos Removals")	575	31

Air Pollution (tons/yr)	2007	1987
Carbon Monoxide (CO)	207,674	183,738
Volatile Organic Compounds (VOC)	22,064	35,183
Nitrogen Oxides (NO _x)	23,196	23,106
Sulfur Dioxide (SO ₂)	1,644	6,973
Particulate Matter Total	1,824	35,077
Particulate Matter (PM ₁₀)	1,436	N/A
Particulate Matter (PM _{2.5})	942	N/A

N/A indicates pollutants not measured at that time

Control Initiatives to Reduce Pollution from Industrial Sources: A 20-Year Review

*By Sheila Holman, Planning Section Chief
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In 1987, ground level ozone was a particular concern for the United States Environmental Protection Agency (USEPA), as well as state and local air agencies. Numerous areas across the country were not meeting the one-hour ozone standard. USEPA was in the process of developing the post-1987 Ozone Policy to guide state and local air agencies in the development of new implementation plans designed to ensure that the one-hour ozone standard was met. Congress was beginning to look at legislative revisions to the Clean Air Act. The National Acid Precipitation Assessment Program was in its seventh year of evaluating the effects of sulfur dioxide and nitrogen oxides on the environment and public health.

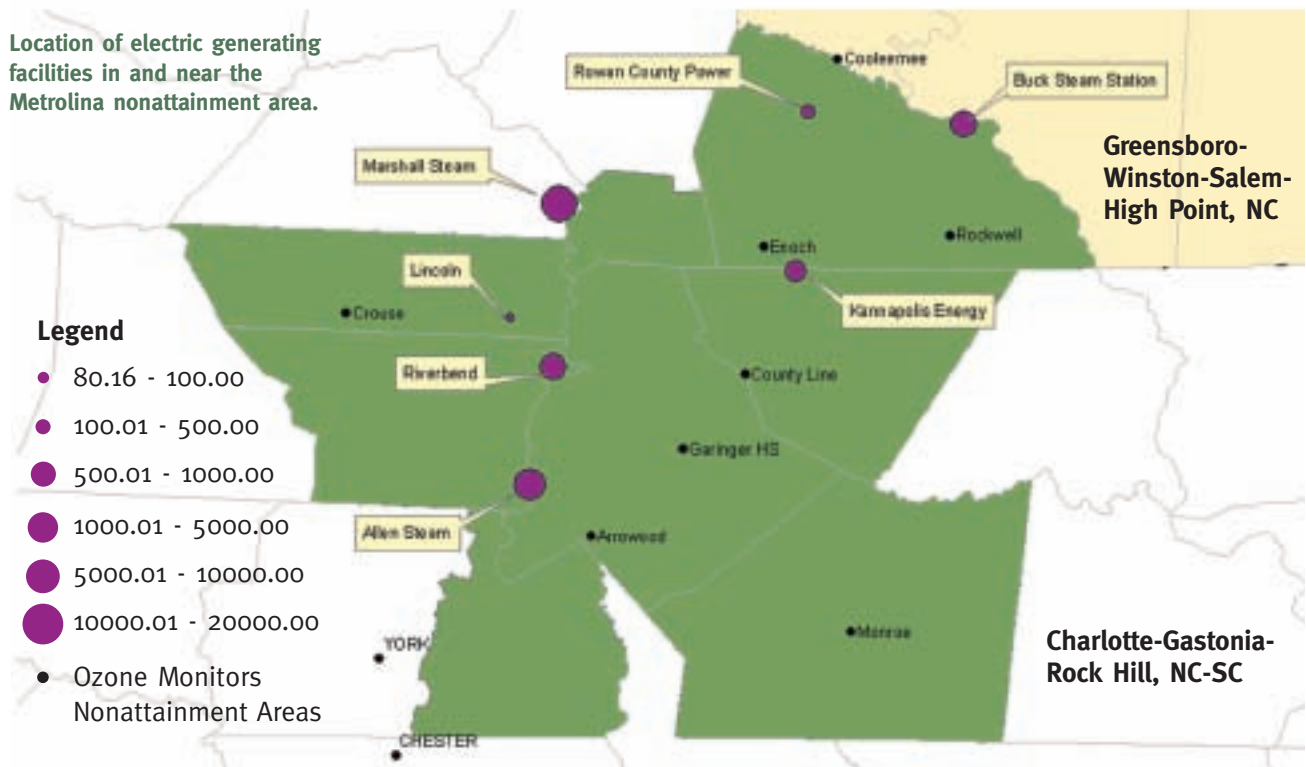
Three years later, with the passage of the Clean Air Act Amendments of 1990, the first step in significant reduction requirements in sulfur dioxide and nitrogen oxide would occur with the Title IV Acid Deposition Control requirements. Title IV set goals for Jan. 1, 2000, of reducing annual sulfur dioxide (SO₂) emissions by 10 million

tons and annual nitrogen oxides (NO_x) emissions by 2.0 million tons from 1980 levels. Beginning in the year 2000, total utility SO₂ emissions are limited to 8.9 million tons and total industrial SO₂ emissions are limited to 5.6 million tons. The focus of the controls was on electric generating units, either utility boilers or large industrial boilers that sold to the grid. The industry could decide how to meet their individual unit allocations — through controls at the unit, or through the purchase of allowances from other sources.

During the implementation of Title IV, some areas continued to struggle with meeting the one-hour ozone standard. There became a general recognition of transport of pollution that was attributed to affecting these areas' ability to meet the standard. In short, a growing community believed that regional controls were necessary to reduce the level of NO_x emissions transported in the eastern United States. In 1995, the Ozone Transport Assessment Group (OTAG) was formed to study this issue. Following the conclusion of OTAG, USEPA then promulgated the NO_x State Implementation Plan (SIP) Call in 1998, which required 22 states in the eastern United States, including North Carolina, to reduce NO_x emissions from large utility and industrial boilers during the high ozone season (May 1 through September 30).

In 1997, USEPA issued a new tighter ozone standard, often called the eight-hour ozone standard, as well as a new fine particle standard, or PM_{2.5} standard. North Carolina realized that to achieve both of these standards would require significant controls in and around North Carolina from both the mobile and industrial sectors. In 1999, the North Carolina General Assembly enacted the Clean Air Bill, a series of measures that addressed mobile source emissions, including an expansive

Metrolina Area Utilities Annual NO_x Emissions



vehicle inspection and maintenance program. In 2002, the North Carolina General Assembly enacted the Clean Smokestacks Act, requiring coal-fired power plants to reduce annual NO_x emissions by 78 percent by 2009. These power plants also must reduce annual sulfur dioxide emissions by 49 percent by 2009 and by 74 percent by 2013. The Clean Smokestacks Act reduces NO_x emissions beyond the requirements of the NO_x SIP Call. One of the first state laws of its kind in the nation, this legislation provides a model for other states in controlling multiple air pollutants from older coal-fired power plants. These two sets of legislation form the basis of the state implementation plans for the current eight-hour ozone standard and the fine particle standard, as well as regional haze.

As other state and local agencies struggled with the eight-hour ozone standard and the new fine particle standard, USEPA moved forward with the adoption of the Clean Air Interstate Rule (CAIR). The purpose of the CAIR is to reduce interstate transport of precursors to fine particle and ozone pollution. The CAIR is similar to the North Carolina Clean Smokestacks Act, in that it establishes more requirements on fossil-fuel-fired boiler or combustion turbine. The rule sets annual state caps for NO_x and SO₂ in two phases. Like the original Title IV

program, the caps can be met through a cap and trade program if a state chooses to participate.

The aggregate effect of these various control programs is improved air quality in North Carolina and throughout the eastern United States. These programs helped the Charlotte area to attain the old one-hour standard and the fine particle standard, and to reduce the levels of the new eight-hour ozone standard. The improvements in air quality would not have been possible without the significant reductions of the industrial sector over the last 20 years. As we look ahead at the next 20 years, the question will be how much further can the industrial sector reduce emissions? Where will state and local air planners look for emission reductions? How will areas attain tighter health based standards, such as the proposed new eight-hour ozone standard, scheduled to be finalized in March 2008? Will the focus shift to the mobile and non-road sectors? Will there be greater reliance on local measures versus state or federal measures? Will there continue to be cleaner technologies introduced for the industrial sector? All of these questions are on the forefront of the air quality planners' minds. The future will require even more teamwork and collaboration by all parties to achieve the health-based standards and provide the clean air that our citizens deserve.

The Clean Air Act: Then and Now

*By Joan Liu, P.E., Program Manager
Mecklenburg County Air Quality*

The Clean Air Act first was enacted in 1955, with major revisions in 1970, 1977 and 1990. Its purpose is to protect human health and the environment from emissions that pollute ambient, or outdoor, air.

The Clean Air Act Prior to 1990

The 1970 Clean Air Act is the first comprehensive federal law that regulates air emissions from area, stationary, and mobile sources. This law authorizes the U.S. Environmental Protection Agency (EPA) to establish health based National Ambient Air Quality Standards (NAAQS), and defines the air pollution control program we have today. It also sent a compelling message to the nation: "The time has come for us to get serious about protecting the environment."

The goal of the act was to set and achieve NAAQS in every state by 1975. The setting of maximum ambient pollutant levels was coupled with directing the states to develop state implementation plans (SIPs) applicable to appropriate industrial sources in the state. Much of this country's environmental progress can be credited to the changes in attitude signaled by the 1970 Clean Air Act.

When many of the deadlines passed without achieving most NAAQS, the Act was amended in 1977. The 1977 law included a "non-attainment" section, primarily to set new dates, extended five years, for attaining NAAQS. It also incorporated a provision to prevent the significant deterioration of air quality in regions where the air is already cleaner than NAAQS.

1990 Clean Air Act Amendments

In 1990, Congress dramatically revised and expanded the Clean Air Act, providing the EPA with even broader authority to implement and enforce

regulations reducing air pollutant emissions. The 1990 Clean Air Act Amendments (90 CAAA) were intended to meet unaddressed or insufficiently addressed problems such as acid rain, ground-level ozone, stratospheric ozone depletion, and air toxics. The 90 CAAA also placed an increased emphasis on more cost-effective approaches to reduce air pollution.

This represented a significant departure from the past. The new law was a major milestone in the evolution of environmental protection in the United States. It provided innovative approaches to pollution control, envisioned an unprecedented degree of cooperation between government and the private sector, and promised a renewed national commitment to environmental protection.

1990 was the last amendment to the Clean Air Act, and it is law under which we now operate. It is a flexible, results-oriented law designed with the marketplace in mind to achieve specific and ambitious environmental goals without necessarily damaging the nation's economic health or hampering its growth. It sets specific air quality standards, yet it also allows a great deal of latitude in deciding how to achieve these objectives. Equally important, the law provides real incentives for companies to seek environmental solutions that work best for them, instead of waiting for the EPA, state, and local authorities to impose solutions through government directives. Ultimately, the 1990 Clean Air Act challenges industry to seize the initiative: to take the lead in the business of environmental protection.

The 90 CAAA consists of the nine separate Titles listed in Table 1 on page 15. Each of these Titles is subdivided into Parts, which are further subdivided into Sections.

Table 1. 1990 Clean Air Act Amendment Titles

Title I	Provisions for Attainment and Maintenance of National Ambient Air Quality Standards
Title II	Provisions Relating to Mobile Sources
Title III	Hazardous Air Pollutants
Title IV	Acid Deposition Control
Title V	Stationary Source Operating Permits
Title VI	Stratospheric Ozone and Global Climate Protection
Title VII	Provisions Relating to Enforcement
Title VIII	Miscellaneous Provisions
Title IX	Clean Air Research

The major 90 CAAA changes include provisions to

- classify non-attainment areas according to the extent they exceed the standard, tailoring deadlines, planning, and controls to each area's status;
- tighten emission standards for autos and other mobile source, and require reformulated and alternative fuels in the most polluted areas;
- revise the air toxics section, establishing a new program of technology-based standards for 188 hazardous air pollutants and addressing the problem of sudden, catastrophic releases of toxics;
- establish an acid rain control program, with a marketable allowance scheme to provide flexibility in implementation;
- require a state-run permit program for the operation of major sources of air pollutants;
- phase out most stratospheric ozone-depleting chemicals; and
- update the enforcement provisions including authority for EPA to assess administrative penalties.

Air Quality History in Mecklenburg County

Since 1977, Mecklenburg County has always met the NAAQS for Sulfur Oxides, Nitrogen Dioxide, Lead, Total Suspended Particulates, and inhalable coarse particles (PM₁₀, particles that have aerodynamic diameter less than or equal to 10 µm). Monitoring data indicate improving or stable pollution trends for these pollutants. The compliance status for these pollutants is not expected to deteriorate in the near future.

On March 3, 1978, the EPA designated Mecklenburg County as a non-attainment area for ozone and carbon monoxide. The North Carolina SIP was revised several times to include control measures for stationary sources and transportation measures for traffic improvements. On July 5, 1995, Mecklenburg County officially was designated as an area that met the carbon monoxide and one-hour ozone standards.

On July 17, 1997, EPA announced a new eight-hour ozone and a fine particle (PM_{2.5}, particles that have aerodynamic diameter less than or equal to 2.5 µm) NAAQS. On April 15, 2004, Mecklenburg County was designated as a moderate non-attainment area for the eight-hour ozone standard, and is required to comply with the standard by June 15, 2010. On June 15, 2007, the North Carolina SIP was submitted to the EPA, which demonstrated that Mecklenburg County can meet the standard by 2010.

In 1999 Mecklenburg County began monitoring for PM_{2.5}. On October 17, 2006, EPA revised the daily PM_{2.5} NAAQS. Up to 2007, the measured monitoring data demonstrated that the County can meet both the 1997 and 2006 daily PM_{2.5} standards, but continue to hover near the annual standard. By implementing all promulgated control measures required by the 90 CAAA, the modeling results conducted by the State of North Carolina's Division of Air Quality indicate that Mecklenburg County can meet the PM_{2.5} annual standard in 2009 and 2018.

Air Quality Monitoring Status Report 2008

*By Jeff Francis, Air Monitoring Manager
Mecklenburg County Air Quality*

The air quality in Mecklenburg County affects every citizen and visitor, regardless of age, sex, race, or occupation.

There have been many changes in Mecklenburg County since this statement was made in the 1987 State of the Environment Report (SOER), but the truth of this statement has not changed. Air quality is important to the health and welfare of our community. Here's a look at where we were in 1987 regarding air quality monitoring, and where we are today.

The Environmental Protection Agency (EPA) has established national ambient air quality standards (NAAQS) for six air pollutants: carbon monoxide (CO), nitrogen dioxide (NO₂), particulate matter (PM₁₀ and PM_{2.5}), ozone (O₃), lead (Pb), and sulfur dioxide (SO₂). These air pollutants are known collectively as the "criteria" air pollutants.

Historically, the County has measured concentrations well below the levels of the NAAQS for nitrogen dioxide, particulate matter-PM₁₀, lead, and sulfur dioxide.

Over the past 20 years, the pollutants that have been of greatest concern in Mecklenburg County have been carbon monoxide, ozone, and PM_{2.5}. This report will address these three air pollutants.

Carbon Monoxide

Carbon Monoxide is a colorless, odorless gas resulting from incomplete fuel combustion. The primary source of CO in Mecklenburg County is motor vehicle emissions. Mecklenburg County was designated a non-attainment area for carbon monoxide in March 1978. During the period from 1974 - 1984 the carbon monoxide NAAQS was often exceeded more than 10 times per year. The number of exceedances per year fell dramatically beginning in the early to mid 1980s. At the time of publication of the 1987 SOER, Mecklenburg County had just experienced two consecutive years (1986-1987) in which the carbon monoxide standard was not exceeded. The last recorded exceedances of the carbon monoxide standard in the Mecklenburg County network (see map on page 21) were measured in 1990. Automotive emission controls found on newer vehicles are the main factor accounting for the reduction in carbon monoxide concentrations. Mecklenburg County was designated by EPA as an attainment area for carbon monoxide in 1995. Carbon monoxide concentration measurements made since 1990 have remained below the NAAQS (Figure 1 on page 22).



Ozone

Ozone is the criteria air pollutant of greatest concern in Mecklenburg County. Ozone is a gas composed of three oxygen atoms. It is not usually emitted directly into the air, but at ground-level is created by a chemical reaction between oxides of nitrogen (NO_x) and volatile organic compounds (VOC) in the presence of sunlight. Motor vehicle exhaust and industrial emissions, gasoline vapors, and chemical solvents as well as natural sources emit NO_x and VOC that contribute to the formation of ozone. Ground-level ozone is the primary constituent of smog. Sunlight and hot weather can cause ground-level ozone to form in

Air Quality continued on page 22



Mecklenburg County Air Monitoring Network

Site	Pollutant Monitored
#11 Fire Station	Particulate Matter - PM_{10}
Arrowood	Ozone Particulate Matter - PM_{10}
County Line	Ozone
Davidson	Particulate Matter - PM_{10}
Garinger	Carbon Monoxide Nitrogen Dioxide Ozone Sulfur Dioxide Particulate Matter - $\text{PM}_{2.5}$
Montclair	Particulate Matter - $\text{PM}_{2.5}$
Oakdale	Particulate Matter - $\text{PM}_{2.5}$

Air Quality continued from page 21

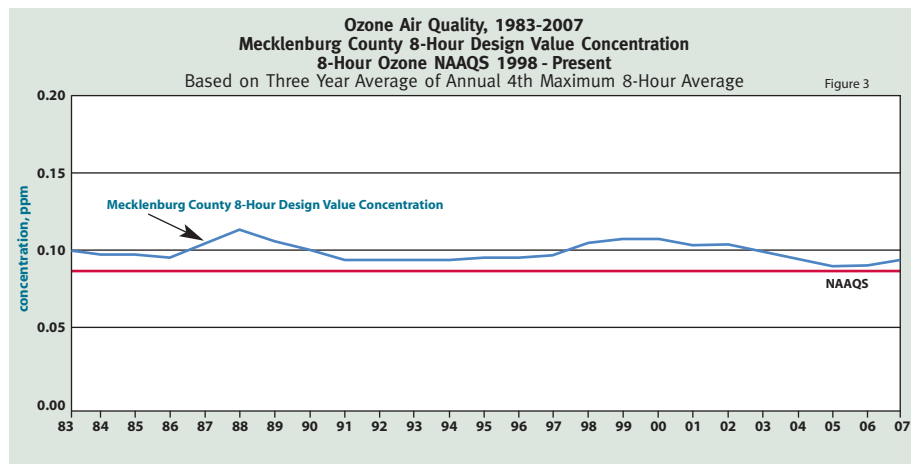
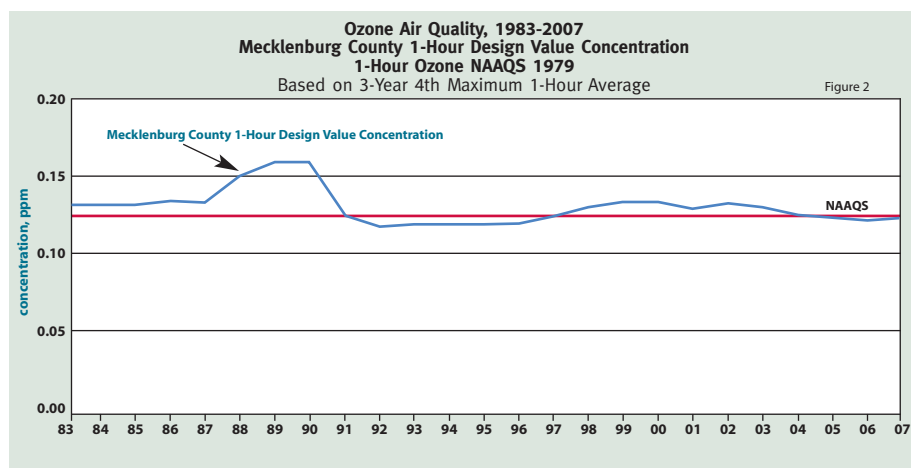
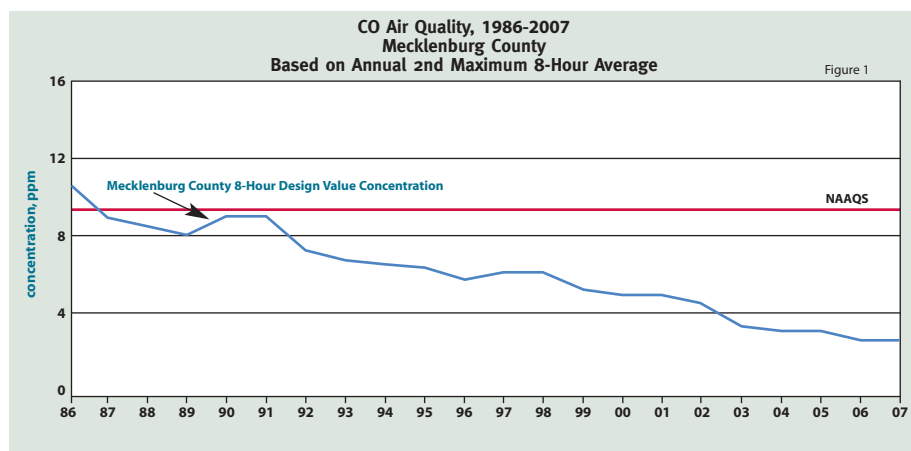
harmful concentrations in the air. As a result, it is known as a summertime air pollutant. For this reason, the months of April through October often are referred to as the “ozone season” in our area.

Mecklenburg County was designated as an ozone non-attainment area in March 1978. Mecklenburg County averaged four days per year from 1981 - 1987 exceeding the (then current) one-hour ozone NAAQS. 1988 monitoring data seemed to verify the 1987 SOER predictions, when 14 days were

measured above the one-hour ozone standard. After 1988, there was a decrease in the number of measurements over the one hour ozone standard, leading to a three year period from 1990 to 1992 when only two days exceeding the one-hour ozone NAAQS were recorded in the County network. The one hour NAAQS compliance value measured in the network in 1992 was 0.118 ppm (See Figure 2). To comply with the one hour NAAQS, values had to be < 0.125 ppm.

In November 1993, the North Carolina Department of Environment and Natural Resources (NCDENR) requested redesignation of the area to attainment with respect to the one-hour ozone NAAQS. EPA approved the redesignation request on July 5, 1995.

In July 1997, EPA issued a revised ozone standard that was more protective of public health and welfare. Scientific information shows that ozone can affect human health at lower levels, and over longer exposure times than one hour. The revised standard is an eight-hour standard with a level of 0.08 ppm. Mecklenburg County was designated non-attainment for the 8 hour NAAQS on June 15, 2004 based upon air quality monitoring data measured during the 2001, 2002 and 2003 ozone seasons. The compliance





value (“design value”) measured in the Mecklenburg County network from 2001-2003 was 0.098 ppm. To comply with the standard, an area’s design value must be < 0.085 ppm. See Figure 3 on page 22.

Although the new eight-hour ozone NAAQS only has been applicable since 1998; looking back from an historical perspective, Mecklenburg County has been in continuous violation of the eight-hour ozone standard since routine monitoring began in the early 1980s.

In 2007, the design value measured in the Mecklenburg County monitoring network was 0.093 ppm. This is the highest design value determined since the 2004 designation year. Mecklenburg County experienced 19 days when the ozone NAAQS was exceeded in 2007 — the most days measured above the eight-hour standard since 2002. Concentration values measured in 2007 were higher than those measured in each of the past four years. To put these measurements into perspective, it should be noted that meteorological conditions play a significant role in ozone formation. 2007 was the sixth-warmest summer (June - August) in North Carolina in the period from 1987 to 2007. 2007 was also the second driest summer (June - August) in North Carolina in the period from 1987 to 2007. These two pieces of information

would indicate that conditions may have been particularly favorable for ozone formation in the summer of 2007; especially in August 2007, when the highest eight-hour concentration (0.127 ppm) of the year was measured. That measurement was the highest eight-hour concentration measured since 1988. Data from 2007 would seem to indicate that the potential for the formation of unhealthy concentrations of ozone at ground-level continues to exist when conditions are optimal.

Ozone continues to be a challenge for Mecklenburg County. Concentrations measured in our network in 2007 (eight-hour design values) were lower than those measured in 1987; however, we continue to measure concentrations above the NAAQS. As stated in 1987: “We have an ozone problem.”

Particulate Matter

Particulate matter is the term for a mixture of solid particles and liquid droplets found in the air. Some particles, such as dust, dirt, soot, or smoke, are large or dark enough to be seen with the naked eye. Others are so small they can only be detected using an electron microscope. Particle pollution includes “inhalable coarse particles,” with diameters larger than 2.5 micrometers and smaller than

Air Quality continued on page 24

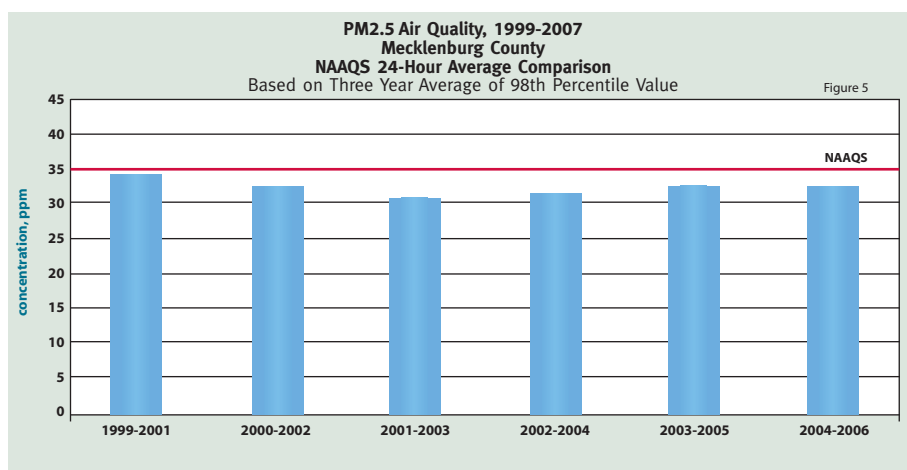
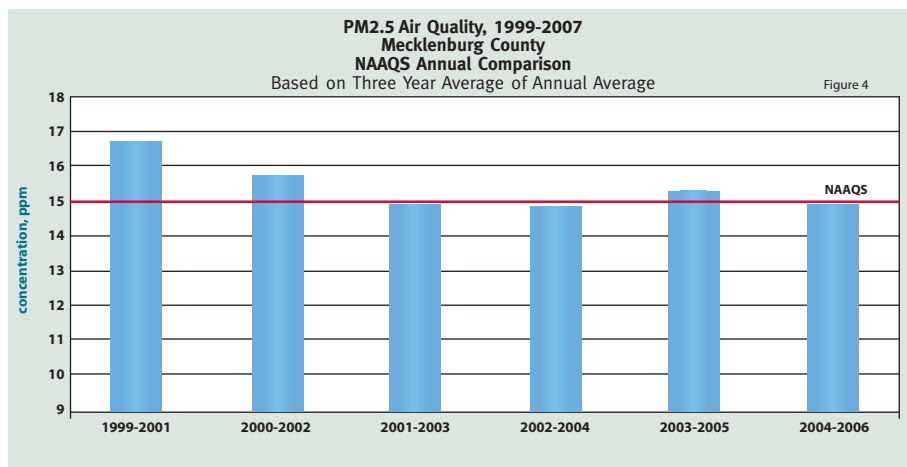
Air Quality continued from page 23

10 micro-meters and “fine particles,” with diameters that are 2.5 micrometers and smaller. How small is 2.5 micro-meters? Think about a single hair from your head. The average human hair is about 70 micrometers in diameter — making it 30 times larger than the largest fine particle.

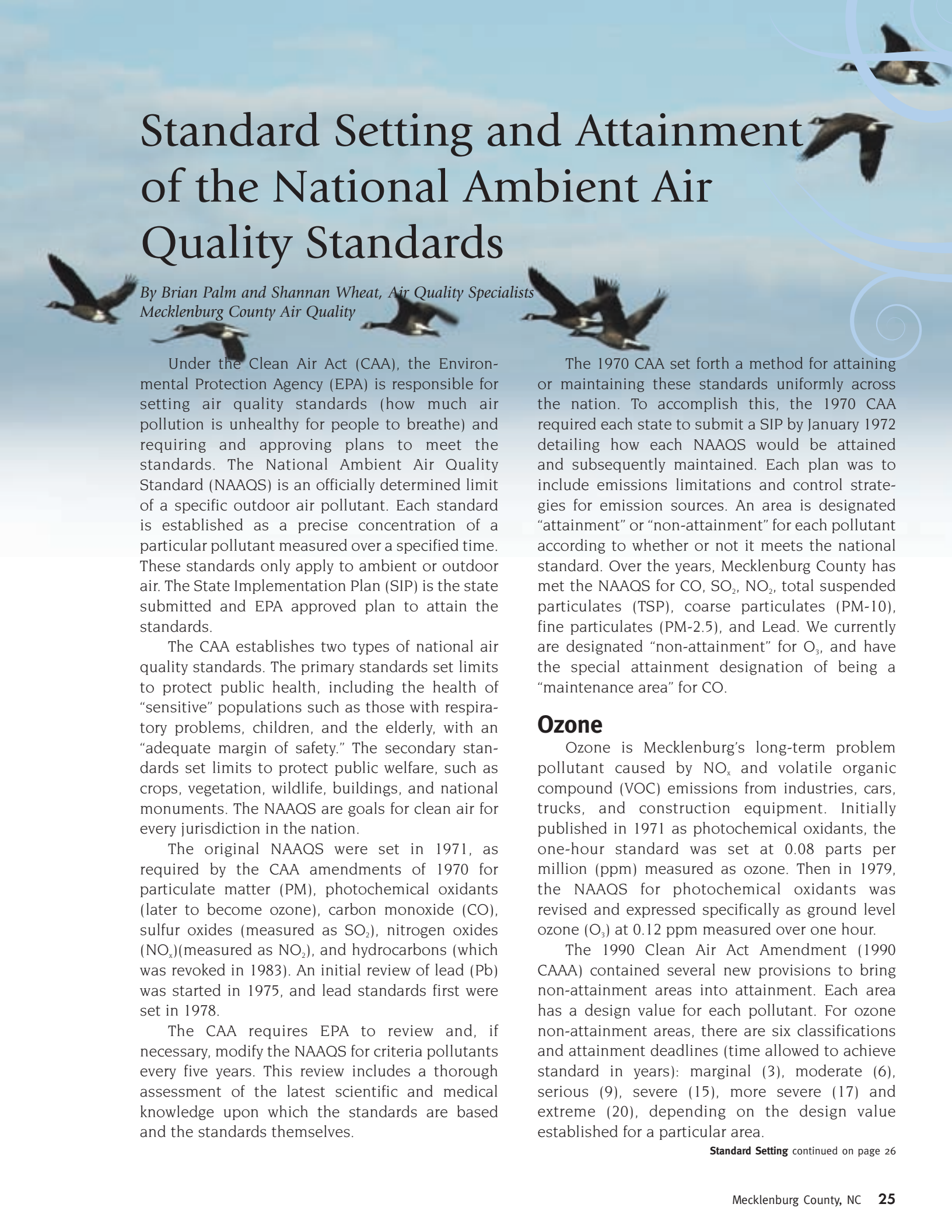
Fine particulate matter or $PM_{2.5}$ is the particle pollutant that is of the most concern in Mecklenburg County. In 1997, EPA issued two standards for $PM_{2.5}$. One standard was a short-term 24-hour standard ($65 \mu g/m^3$) and the other was a long-term annual standard ($15.0 \mu g/m^3$). The 24-hour standard was revised to a more protective level of $35 \mu g/m^3$ in 2006. The annual standard was retained at $15.0 \mu g/m^3$.

Nationwide monitoring for $PM_{2.5}$ began in 1999. The following graphic (Figure 4) depicts annual standard data collected in the network to date.

EPA issued designations for non-attainment of the $PM_{2.5}$ NAAQS in December 2004 based on 2001-2003 data. (A three-year average is used.) At the time, Mecklenburg County data was below the annual standard, and the county was not designated. The annual compliance value for 2006, our most recent complete data set, was $14.9 \mu g/m^3$. Annual NAAQS compliance values are very close to the $PM_{2.5}$ annual NAAQS of $15.0 \mu g/m^3$.



The concentration measurement used to determine compliance with the 24-hour $PM_{2.5}$ standard in 2006 was $32 \mu g/m^3$, just below the 24-hour standard of $35 \mu g/m^3$. Figure 5 compares data measured in the Mecklenburg County network with the 24-hour NAAQS. Mecklenburg County's 24-hour concentrations are below the 24-hour $PM_{2.5}$ NAAQS.



Standard Setting and Attainment of the National Ambient Air Quality Standards

*By Brian Palm and Shannan Wheat, Air Quality Specialists
Mecklenburg County Air Quality*

Under the Clean Air Act (CAA), the Environmental Protection Agency (EPA) is responsible for setting air quality standards (how much air pollution is unhealthy for people to breathe) and requiring and approving plans to meet the standards. The National Ambient Air Quality Standard (NAAQS) is an officially determined limit of a specific outdoor air pollutant. Each standard is established as a precise concentration of a particular pollutant measured over a specified time. These standards only apply to ambient or outdoor air. The State Implementation Plan (SIP) is the state submitted and EPA approved plan to attain the standards.

The CAA establishes two types of national air quality standards. The primary standards set limits to protect public health, including the health of “sensitive” populations such as those with respiratory problems, children, and the elderly, with an “adequate margin of safety.” The secondary standards set limits to protect public welfare, such as crops, vegetation, wildlife, buildings, and national monuments. The NAAQS are goals for clean air for every jurisdiction in the nation.

The original NAAQS were set in 1971, as required by the CAA amendments of 1970 for particulate matter (PM), photochemical oxidants (later to become ozone), carbon monoxide (CO), sulfur oxides (measured as SO₂), nitrogen oxides (NO_x) (measured as NO₂), and hydrocarbons (which was revoked in 1983). An initial review of lead (Pb) was started in 1975, and lead standards first were set in 1978.

The CAA requires EPA to review and, if necessary, modify the NAAQS for criteria pollutants every five years. This review includes a thorough assessment of the latest scientific and medical knowledge upon which the standards are based and the standards themselves.

The 1970 CAA set forth a method for attaining or maintaining these standards uniformly across the nation. To accomplish this, the 1970 CAA required each state to submit a SIP by January 1972 detailing how each NAAQS would be attained and subsequently maintained. Each plan was to include emissions limitations and control strategies for emission sources. An area is designated “attainment” or “non-attainment” for each pollutant according to whether or not it meets the national standard. Over the years, Mecklenburg County has met the NAAQS for CO, SO₂, NO₂, total suspended particulates (TSP), coarse particulates (PM-10), fine particulates (PM-2.5), and Lead. We currently are designated “non-attainment” for O₃, and have the special attainment designation of being a “maintenance area” for CO.

Ozone

Ozone is Mecklenburg’s long-term problem pollutant caused by NO_x and volatile organic compound (VOC) emissions from industries, cars, trucks, and construction equipment. Initially published in 1971 as photochemical oxidants, the one-hour standard was set at 0.08 parts per million (ppm) measured as ozone. Then in 1979, the NAAQS for photochemical oxidants was revised and expressed specifically as ground level ozone (O₃) at 0.12 ppm measured over one hour.

The 1990 Clean Air Act Amendment (1990 CAAA) contained several new provisions to bring non-attainment areas into attainment. Each area has a design value for each pollutant. For ozone non-attainment areas, there are six classifications and attainment deadlines (time allowed to achieve standard in years): marginal (3), moderate (6), serious (9), severe (15), more severe (17) and extreme (20), depending on the design value established for a particular area.

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As a result of the 1990 CAAA, Mecklenburg and Gaston counties were designated as a moderate one-hour ozone non-attainment area. During the period from 1990 through 1993, the non-attainment area had ambient monitoring data that showed no violations of the ozone NAAQS; therefore, the State of North Carolina submitted an ozone maintenance plan and requested re-designation of the area to attainment with respect to the one-hour ozone NAAQS. EPA approved the re-designation request on July 5, 1995.

Studies found that O₃ exposure becomes increasingly significant over longer averaging times, suggesting the need for a change from the original one-hour standard. In July 1997, EPA promulgated new standards, an eight-hour averaged ozone standard, and daily- and annually-averaged PM_{2.5} standards. The new ozone standard is 0.08 ppm averaged over an eight-hour period (because of rounding technique, this standard is effectively 0.084 ppm). With the passage of the new standard, EPA revoked the old one-hour ozone standard in many areas that met the old standard, including Mecklenburg County.

On April 15, 2004, Mecklenburg County and seven surrounding counties (southern Iredell, Rowan, Cabarrus, Union, Gaston, Lincoln, and part of York County, SC) were designated as a moderate non-attainment area for the eight-hour ozone standard. The region, identified by the North Carolina Division of Air Quality (NCDAQ) as "Metrolina," now is required to meet the national ozone standard by June 15, 2010, (i.e., the end of 2009 ozone season). Mecklenburg County's long-term ambient data show that it never has been able to meet the eight-hour ozone standard. As a result of the ozone non-attainment

designation, NCDAQ submitted a SIP to USEPA in June 2007 that demonstrates this region can meet the standard by 2010.

The Metrolina region is a "NO_x limited" area. This means that the area needs to control NO_x emissions to reduce ozone formation effectively. The major sources of NO_x emissions in the region come from mobile sources and electric generating facilities. Reduction of emissions from these two source sectors significantly can influence the ozone formation in this region. The SIP for the Metrolina region includes the following control measures:

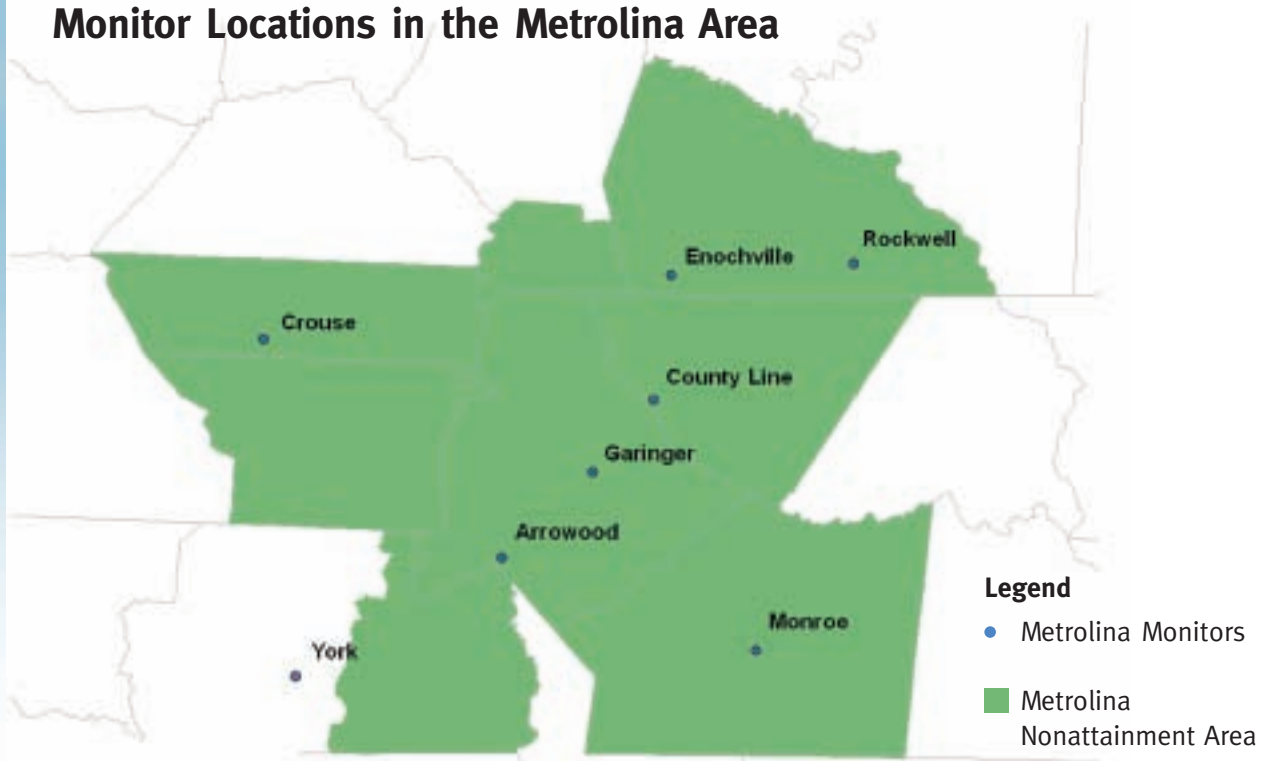
- 15% VOC Reasonable Further Progress (RFP) Plan;
- VOC and NO_x Reasonably Available Control Technology (RACT);
- Reasonably Available Control Measures (RACM);
- Motor Vehicle Inspection and Maintenance programs (I/M);
- Federal Emission Standards for highway vehicles and non-road equipment;
- Fuel Standards; and
- Industrial NO_x emission reductions required by federal and state control initiatives such as the NO_x SIP call, Clean Air Interstate Rule, and NC Clean Smokestacks Act.

In the 2007 SIP, 2002 was used as the base year for emissions inventory, monitoring, and meteorological data. One of the SIP requirements is a modeling attainment demonstration. The new modeling attainment test uses a combination of real ambient air quality data with relative changes in ozone in the air quality modeling. The Metrolina 2009 expected ozone levels are listed in the following table with the monitored 2007 design value.

Modeled Ozone Compliance Values - Metrolina NC

Monitoring Sites	Current Design Value 2005-2007	Modeled Design Value 2009
County Line	0.093	0.085
Enochville	0.091	0.084
Rockwell	0.089	0.083
Garinger (Plaza)	0.090	0.084
Crouse	0.083	0.078
Arrowood	0.083	0.075
Monroe	0.081	0.076
York, SC	0.079	0.071

Monitor Locations in the Metrolina Area



When 2009 site-specific modeled values are between 0.082 and 0.087 part per million (ppm), a “weight of evidence” analysis is required as part of the SIP submittal. A weight of evidence analysis is a supplement to the modeled attainment demonstration and further supports that the area will attain the NAAQS for eight-hour ozone by June 15, 2010. As part of the weight of evidence analysis, the NCDAQ proposes an alternative method to calculate the base design value, evaluates the modeling metric, reviews other air quality modeling results, and lists further control strategies that are not included in the modeling.

NCDAQ believes that the modeling attainment demonstration, in conjunction with the weight of evidence analyses, provides the necessary evidence that the Metrolina area will attain the ozone NAAQS by the prescribed attainment date.

On June 20, 2007 the EPA proposed revisions to the eight-hour O₃ NAAQS. These changes are based on current scientific studies which reveal that the current eight-hour O₃ standard is not adequate to protect public health. The EPA has proposed that the new standard be set within the range of 0.070 ppm, 0.075 ppm and 0.080 ppm. A 90-day public comment period ended in September 2007, and the final rule was expected in March 2008.

Particulate Matter (PM)

Mecklenburg currently measures PM-2.5 levels near the annual standard, and it continues to be a pollutant of concern. Since the inception of the particulate matter NAAQS, there have been many changes. One significant change has been the classification of the PM standards. The term PM consists of both solid particles and liquid droplets (also known as “condensables” or “mists”) found in the air. Many manmade and natural sources emit PM directly, or discharge other pollutants that react in the atmosphere to form PM. These solid and liquid particles come in a broad range of sizes.

The original 1971 NAAQS established limits for PM as TSP. These standards addressed all particulate matter regardless of its size. EPA acknowledged, after the TSP standards were established, that larger particles were not as significant a health risk as smaller particles, and smaller particles were more responsible for human health effects. This is because smaller particles have a greater ability to penetrate into the upper respiratory system and lungs while the larger particles settle to the ground quickly and can be filtered and expelled by the body when inhaled.

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EPA began to evaluate the TSP standards in October 1979. After an extensive review, EPA announced a considerable modification to the original standard on July 1, 1987. With these revised standards, EPA changed the indicator for particles from TSP to PM-10, which focused on particles with an aerodynamic diameter less than or equal to 10 micrometers (μm). PM-10, referred to as inhalable coarse particles, pose a health concern because they can accumulate in the respiratory system.

In 1997, EPA announced a new NAAQS for PM which retained the PM-10 standard and introduced an additional PM-2.5 standard. Particles with aerodynamic diameter less than 2.5 μm are referred to as "fine" particles, and are believed to pose the largest health risks. Because of their small size (less than one-seventh the average width of a human hair), fine particles can be inhaled deeply into the lungs.

In September 2006, the agency revised the 1997 PM standards. The 2006 revisions addressed both PM-2.5 and PM10. The 24-hour PM-2.5 standard was tightened from 65 micrograms per cubic meter ($\mu\text{g}/\text{m}^3$) to 35 $\mu\text{g}/\text{m}^3$, and the annual PM-10 standard was revoked due to a lack of evidence linking health problems to long-term exposure to coarse particle pollution. Both the annual PM-2.5 standard of 15.0 $\mu\text{g}/\text{m}^3$ and the 24-hour PM-10 standard of 150 $\mu\text{g}/\text{m}^3$ were retained.

The speciation of PM-2.5 monitoring data indicates that sulfate, the condensate of SO_2 , is one major contributor to PM-2.5 formation. Controlling SO_2 emission sources in this region may reduce PM-2.5 concentrations in the County. A regional model performed by a consortium of southeastern state air regulatory agencies (Association for Southeastern Integrated Planning) projects that Mecklenburg County will meet the current standards by 2009.

Carbon Monoxide, Sulfur Oxides, Nitrogen Oxides and Lead

In March 1978, the USEPA designated Mecklenburg County as a non-attainment area for ozone and carbon monoxide. The North Carolina SIP was revised in 1979 to address Mecklenburg

County as a non-attainment area. It included more stringent regulations of the larger stationary sources of VOC, which also are known as hydrocarbons or solvents, and the transportation control measures for traffic improvements.

The 1977 Clean Air Act Amendment (1977 CAAA) required achievement of NAAQS by December 1982. Mecklenburg County was granted a five-year extension for carbon monoxide when the revised plan demonstrated that attainment was not possible by 1982, despite the implementation of all reasonably available stationary and transportation control measures.

Faced with the possibility of a construction ban and the withholding of federal transportation funds, an inspection/maintenance (I/M) program for the control of carbon monoxide emissions from automobiles was instituted in Mecklenburg County on December 1, 1982. The County has complied with the CO NAAQS since 1986, and officially was designated as a carbon monoxide attainment area on July 5, 1995.

Although retained through a number of NAAQS reviews, EPA initiated another review of the sulfur oxides standards in May 2006. The proposed rule is due July 2009 and the final rule will be by March 2010.

On April 30, 1971, the EPA promulgated identical primary and secondary NAAQS for NO_x measured as nitrogen dioxide (NO_2) of 0.053 ppm (100 $\mu\text{g}/\text{m}^3$) averaged over one year. The primary and secondary NO_2 standards were reviewed several times, most recently in 2007, and the EPA decided that the existing standards adequately protected against adverse health and welfare effects. The original 1971 NO_2 standards remain unchanged to this day.

On November 1, 2007, EPA released recommendations to strengthen the existing Pb standards to be further protective of public health. The recommendations suggested EPA to lower the current primary standard of 1.5 $\mu\text{g}/\text{m}^3$ to a range of 0.1-0.2 $\mu\text{g}/\text{m}^3$ (levels that currently are seen in many urban areas across the US), and 0.02-0.05 $\mu\text{g}/\text{m}^3$ (the lowest levels assessed). The current schedule calls for the EPA to propose actions no later than May 2008, and to take final action by September 2008.

Air Quality Title V Operating Permit Program: Local Authority



*By Donna Cavaliere, P.E., Sr. Air Quality Specialist
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Known as the Operating Permit Program, Title V was enacted on November 15, 1990 as part of the 1990 amendments to the Clean Air Act (CAA). The goal of the Operating Permit Program was to ensure compliance, and more thorough air pollution control, by consolidating all air pollution requirements into a comprehensive permit that details all aspects of a source's yearly air emission activities. Modeled after the National Pollution Discharge Elimination System (NPDES) Permit required by the Clean Water Act (CWA), the Title V permit program required states to develop and implement the program and the Environmental Protection Agency (EPA) to provide assistance to states and local governments in developing and implementing these programs. Title V permits are required for major sources of regulated pollutants. A major source is defined as any stationary source or group of stationary sources located within a contiguous area under common control that emits or has the potential to emit greater than 100 tons per year of any criteria pollutant, 10 tons per year of any individual hazardous air pollutant (HAP), or 25 tons per year of any combination of HAPs.

On February 23, 1994, Mecklenburg County Air Quality submitted its revised and final Title V Operating Permit Program Plan to the EPA. The plan included a copy of the Title V regulations adopted by the Mecklenburg County board of County Commissioners on January 18, 1994, which became effective February 1, 1994 (a.k.a. MCAPCO).

In 1996 and early 1997, there were 16 identified Title V-applicable facilities. Fifteen initial Title V permits eventually were issued. Since that time, several facilities have dropped out of the Title V program by either accepting limits to become classified as "Synthetic Minor" facilities, or by the closing of the facility. In addition there has been one facility that was reclassified from

Synthetic Minor to Title V after an increase in production made it impossible to meet their Synthetic Minor limits. At the time of this writing, there are 12 facilities classified as Title V in Mecklenburg County.

The Title V program also required state and local air agencies to collect fees from the air quality permit holders to support operation of the respective permit programs. As such, the Title V program was designed to be completely self sufficient, relying on these fees to offset program expenditures.

Mecklenburg County is also required to notify affected states, those in the surrounding areas, of pending permits, and provide time for review of the proposed permit if requested.

Section 507 of the CAA requires states to establish a small business stationary source technical and environmental compliance assistance program. Mecklenburg County went one step further and established an assistance program at the local level. We now enjoy a working relationship with the University of North Carolina at Charlotte's (UNCC) Environmental Assistance Office (EAO) for Small Business. Over the past 10 years, the EAO has held successful pollution prevention workshops, and provided one-on-one assistance to nearly 300 industry and business representatives in the manufacturing and service sectors.

Since 1996 when the first Title V permit applications began arriving, Mecklenburg County Air Quality has been able to write more comprehensive permits for major facilities, and provide better enforcement based on enhanced monitoring and reporting requirements, while still providing more permitting flexibility for the facilities. Results from an EPA audit conducted on our program on September 12, 13, and 16, 2005 indicate that the Mecklenburg County Title V Permitting Program is "operating at a high level of proficiency."

Mobile Sources: Then and Now 1987-2007

*By Dana Etherton, Air Quality Specialist
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Over the past 20 years, there has been significant effort devoted to cleaning up mobile sources of air pollution. Mobile sources are categorized as either on-road (cars, trucks, and buses) or off-road (bulldozers, forklifts, lawnmowers, etc). Thanks to increasingly stringent engine and fuel standards, pollution from these sources is decreasing; however, there are several factors that threaten to negate the progress that has been made.

EPA Gets the Lead Out

The past two decades have seen one of the greatest air quality success stories. In 1973, the United States Environmental Protection Agency (EPA) slowly began to phase out lead from gasoline used in passenger cars and light duty trucks. The change to unleaded gasoline was complete by 1996. This single action reduced ambient concentrations of lead from hazardous levels to the point where they are so low that we no longer need to monitor this pollutant.

NC Makes Changes to the Vehicle Inspection and Maintenance Program

Mecklenburg County has had an inspection and maintenance (I/M) program for passenger cars since the early 1980s. Historically, this consisted of a technician directly measuring the gases coming from a vehicle's tailpipe. Beginning in 1996, all light-duty vehicles were required to be equipped with On-Board Diagnostic (OBD) systems. These computer systems constantly check all components of a vehicle's exhaust and emission control system (engine, catalytic converter, oxygen sensor, gas cap, etc.) to verify that they are working within the manufacturer's specifications. If something is not right, the vehicle's check engine light will alert the driver of a potential problem. Because of this change, the tailpipe test was discontinued in

Mecklenburg

County on January 1, 2006. When a vehicle now is inspected, the technician connects the car to a computer to verify that all systems are functioning normally. This change in the I/M program will ensure that all inspected vehicles are operating efficiently and that necessary repairs are made.

Federal Engine Standards Help Reduce Ozone-Forming Pollution

EPA has adopted two sets of engine standards for manufacturers of cars and light duty trucks. Tier 1 standards were phased-in between 1994 and 1997, and were followed up with Tier 2 standards between 2004 and 2009. These standards primarily address nitrogen oxide (NO_x) pollution, which is the main ingredient of Mecklenburg County's ground level ozone problem. NO_x emissions will decrease from 1 gram per mile before 1994 to an average of 0.07 grams per mile after 2009 for most light duty vehicles, a 93-percent improvement. In 2005, EPA also limited the amount of sulfur in gasoline to 30 ppm (formerly 300 ppm). Sulfur in gasoline decreases the effectiveness of the catalytic converters that were required on passenger cars since the mid 1970s. Catalytic converters, through a combination of heat and chemical reactions, reduce the emissions of carbon monoxide, volatile organic compounds, and NO_x. By lowering the amount of sulfur in gas, in-use vehicles automatically will become cleaner.

Finally, EPA has set more stringent standards for on-road heavy duty diesel trucks as well. Sulfur in on-road diesel fuel was reduced from 500 ppm to 15 ppm by October 2006. This allowed engine manufacturers to use more advanced emission control devices to meet 2007 standards, and even more stringent standards are scheduled to take effect in

2010. By 2010, diesel engines will be more than 90 percent cleaner than they were in the 1990s.

Despite these gains in emission control technology, certain social factors are threatening to cause an increase in total pollution coming from on-road mobile sources. The population of Mecklenburg County almost has doubled between 1987 and 2007. In addition to the growing population, it has become popular for the average family to have two or three vehicles. Finally, as the population grows, people are moving farther away from the center of the city, increasing the average distance that each person drives in a day. These factors all contributed to an increase in the total number of vehicle miles traveled per day from 11 million in 1987 to almost 30 million in 2006.

Federal Standards for Off Road Equipment Take Effect

Regulation of non-road vehicles and equipment only began within the last 10 years. Federal Tier 1 engine standards for non-road diesel engines were introduced for larger engines (175 horsepower and larger) in 1996, and were in place for all engine sizes by 2000. Tier 2 standards were phased-in between 2001 and 2007. In 2006, sulfur in most non-road diesel fuel was limited to 500 ppm (formerly 3000 ppm), and further will be capped at 15 ppm between 2010 and 2012. Removing the sulfur from non-road diesel fuel will pave the way for advanced emission control technologies that will

be necessary to meet the Tier 3 and Tier 4 engine standards starting between 2006 and 2011. These new standards will reduce pollution from these non-road engines approximately 97 percent.

EPA also has begun to address emissions from small non-road gasoline engines like those found in lawnmowers and weed eaters. The first emission standards were set for these engines in 1997. Another rule was proposed in 2007 to further limit pollution from this sector starting in 2011. The proposed standards will reduce exhaust emissions by 35 percent.

As with the on-road mobile sources, there are obstacles to achieving the anticipated emission reductions from new off-road engine standards. Diesel engines are popular because they are very durable and last a long time, sometimes more than 30 years. The engines manufactured in the early 1990s, before the new regulations began to take effect, possibly could be in use into the 2020s. Because new off-road equipment is very expensive (hundreds of thousands of dollars in many cases), very few companies voluntarily will upgrade their equipment to get the new, cleaner engines into service.

There has been significant progress made by efforts to control emissions from new on-road and off-road mobile sources; however, the maximum benefits of these new regulations will not be seen until considerable fleet turnover has occurred, and old engines are no longer in service.



Reducing TAPs and VOCs at Gasoline Dispensing Facilities

*By Dan Hardin, Air Quality Specialist
Mecklenburg County Air Quality*

In many ways, controlling toxic air pollutants (TAPs) and volatile organic compounds (VOCs) being emitted from gasoline dispensing facilities ("facilities") is a lot like trying to eat an elephant. An enormous challenge awaits, and the only way to address it figuratively is to take one bite at a time.

Between 1987 and 1992, the facilities in Mecklenburg County did not have any air pollution control equipment controlling TAP or VOC emissions from the underground storage tanks (USTs) at a gasoline dispensing facility; however, with the arrival of Stage I vapor recovery in 1993, it all began to change for the better.

Stage I

In 1990, Congress passed a law known as the Clean Air Act Amendments (CAAA). Title III of the 1990 CAAA established technology based requirements for 188 toxic air pollutants. In 1990, the State of North Carolina also implemented a health-based air toxics program. Gasoline dispensing facilities emit several toxic air pollutants such as benzene, toluene, and xylene. After a series of meetings between government regulators and industry associations, a difficult decision was made as to how to regulate the facilities.

Effective in 1993, any facility that sold more than 50,000 gallons of gasoline in a calendar year was required to be equipped with a new "closed loop" vapor balance system, known as Stage I. It consisted of piping and valves interconnecting USTs and vapor tight tanker trucks, which captured toxic vapor at a 95-percent efficiency when they were displaced from USTs receiving gasoline products. The vapors captured in the emptied tanker trucks were transported to a bulk gasoline terminal. When the tanker truck is loaded with another batch of product, the displaced vapors are controlled by either a vapor recovery or combustion unit at that terminal. At this time, there are more than 300 permitted Stage I gasoline stations in Mecklenburg County.

Stage II and ORVR

Since the 1990 CAAA designated Mecklenburg County as a moderate non-attainment area for ozone, it was required to take actions to reduce VOC emissions including a new control measure called Stage II vapor recovery (Stage II). Piping and valves are placed on both the UST and the gasoline dispenser to capture 95 percent of the vapors that otherwise would have escaped unscathed to the atmosphere during a passenger vehicle refueling event. The VOCs and toxics in the vapors are returned to the UST for containment.

Ozone monitoring data between calendar years 1990 and 1993 indicated Mecklenburg County was in compliance with the one-hour ozone standard and, active Stage II would not have to be implemented at the facilities as a VOC control; however, addressing the toxics emissions (such as benzene, hexane, toluene, and xylene) was a horse of a different color. Stage II already had proven to be very effective at capturing vapors from facilities elsewhere in the United States where their VOC and toxic problems were much worse than those occurring in Mecklenburg County.

Effective June 30, 1994, any facilities dispensing greater than 10,000 gallons of gasoline in a calendar month were required to install Stage II vapor recovery piping when installing, replacing, removing, or repairing a UST. The Mecklenburg County Air Pollution Control Ordinance (MCAPCO) exempts these same facilities from Local air toxic regulation applicability because of this requirement. To date, approximately half of the permitted Stage I facilities now are equipped with inactive Stage II piping.

The 1990 CAAA also required new passenger cars to capture refueling emissions. On April 6, 1994, the US Environmental Protection Agency published a final rule requiring the control of vehicle refueling emissions through the use of Onboard Refueling Vapor Recovery (ORVR) vehicle-based systems. The requirement was



implemented in phases. Simply put, ORVR is like an operable Stage II vapor recovery system, only it is part of the vehicle's emission control system, not a part of the UST. During vehicle refueling events, 95 percent of the VOCs emitted are captured, placed in a special charcoal canister, and sent to the engine to be consumed as fuel. Beginning in 1998, ORVR was placed on 40 percent of the new cars with 80 percent placed on the new cars in 1999. By 2000, 100 percent of the new cars produced were similarly quipped. By 2006, all new trucks to an 8,500 pound gross vehicle weight rating also had an ORVR in place as standard equipment.

The federal regulation allows an area to remove Stage II vapor recovery systems when the percentage of the vehicle fleet equipped with ORVR equals or exceeds 90 percent. Due to the fleet turn over rate, many areas of the United States soon may be able to remove Stage II from service. Effective March 1, 2007, MCAPCO no longer required Stage II vapor recovery piping to be installed in Mecklenburg County.

Preventing the Accidental Release of Hazardous Materials to the Air

*By Chuck Greco, Air Quality Supervisor
Mecklenburg County Air Quality*

Public awareness of the potential danger from accidental releases of hazardous chemicals has increased over the years as serious chemical accidents have occurred around the world. After the 1984 chemical tragedy in Bhopal, India, the U.S. Environmental Protection Agency (EPA) began programs to improve emergency planning at the local level. In 1986, Congress adopted many aspects of these programs as the Emergency Planning and Community Right-to-Know Act (EPCRA). As its title indicates, EPCRA focuses on understanding hazards and planning for emergencies to ensure that when an accidental release occurs, the local responders, such as the fire department, will be able to take quick, effective actions to protect public health and the environment.

The EPA recognized, however, that for hazardous gases — and liquids that rapidly become gases when released — emergency response was not enough. These hazardous substances move quickly into the community when an accident occurs; emergency response actions can limit the release, but may not be sufficient to protect public health. For these materials, the focus shall be on accident prevention as well as emergency response.

In 1986, the EPA began working with industry to identify ways to improve safety practices. In 1990, Congress formalized this program by including prevention requirements in its amendments to the Clean Air Act to address the dangers of hazardous chemicals released to the air. (These prevention

requirements can be found in section 112(r) of the Clean Air Act; therefore, the program is referred to as the 112(r) program.) EPA set regulations implementing the 112(r) program in 1996 called the Chemical Accident Prevention rule, but probably is best known as the Risk Management Plan (RMP) rule.

In the rule, the EPA identified 77 toxic and 63 flammable materials of concern, and established threshold quantities for each chemical. The rule, which is built on existing industry codes and standards, requires companies of all sizes that use or store greater than a threshold quantity of any one of those chemicals, to develop an RMP.

A facility's RMP is submitted directly to the EPA according to the required schedules. Each facility is required to review, update, and resubmit its RMP at least every five years. Since the original 1999 submissions, some facilities have eliminated use of the material that made them subject to the rule, for example the Charlotte-Mecklenburg Utility Department waste water treatment plants have stopped using chlorine in favor of ultraviolet light for disinfection. Facilities also have been added to the program due to changes to a process or material usage.

In March 2003, Mecklenburg County Air Quality (MCAQ) was granted authority to administer the RMP program within Mecklenburg County. At this time, there are 22 facilities with active RMPs in the County. These include a wide range of processes



and materials, from chlorine for water treatment plants and ammonia for refrigeration systems at large regional distribution centers for the food industry, to ethylene oxide for sterilizing medical supplies and butane for the production of plastic foam trays for the meat packaging industry.

As the implementing agency for the RMP program in Mecklenburg County, it is the goal of MCAQ to assure that all facilities in the County subject to the rule have submitted an RMP, that the plans developed by each facility meet the requirements of the rule, and that each facility actively is implementing the plan it submitted. MCAQ aims to accomplish this goal in two ways:

- ❶ Providing information and guidance on the requirements of the RMP program to facilities in the County through the air quality permitting process and the MCAQ Web site, and
- ❷ Conducting compliance inspections/audits of facilities subject to the rule.

General Duty Clause

Even a facility not required to submit an RMP may be subject to the rule through the section known as the General Duty Clause. While the EPA has delegated responsibility for implementing the bulk of the RMP program to state and local authorities, the EPA maintained authority to enforce this section. The General Duty Clause

states that owners and operators of a facility processing, handling, or storing extremely hazardous substances have a general duty to:

- ❶ Identify hazards associated with a potential accidental release;
- ❷ Design and maintain a safe facility, taking steps to prevent releases; and
- ❸ Minimize the consequences of accidental releases that do occur.

Note that this requirement is not limited to the finite list of chemicals or established thresholds in the RMP regulation. Congress has made it clear that the term “extremely hazardous substance” includes:

- Other agents which may as the result of short term exposures associated with releases to the air cause death, injury, or property damage, and/or
- The release of any substance that causes death or serious injury because of its acute toxic effect or as a result of an explosion or fire or that causes substantial property damage by blast, fire, corrosion, or other reaction.

Such an incident would trigger substantial public and regulatory agency involvement, and could result in citations and penalties on the basis of violating “general duty” requirements.

Federal Regulation of Air Toxics - Pre-1990 vs. Post-1990

*By M. Jason Rayfield, Air Quality Supervisor
Mecklenburg County Air Quality*

Reduction of toxic air pollutants or air toxics has been a concern in Mecklenburg County since the 1980s. Air toxics are a select number of chemicals that are released into the atmosphere by natural, industrial, residential, and mobile sources. Exposure to certain levels of these pollutants may cause a number of serious health problems including cancer. Since 1990, Mecklenburg County Air Quality (MCAQ) has administered two separate programs targeting a reduction in air toxics — a federal, technology-based program and a state, health-based program. The federal program implemented by the Environmental Protection Agency (EPA) under the 1990 Clean Air Act Amendments (CAAA) has proven to be effective in regulating a significant number of emission source types as well as pollutants.

Prior to 1990, federal efforts to regulate air toxics were based on a health-based approach in which numerical emission standards were to be established for each pollutant. With the enactment of the 1970 CAAA, EPA was assigned the responsibility for identifying “hazardous air pollutants” (HAPs), and developing emission limitations for each pollutant. EPA found that setting health-based standards was a difficult process because of uncertainty in assessing health effects and the number of pollutants to study. As a result, standards were set for only eight pollutants over a 20-year period. These standards, referred to as National Emission Standards for Hazardous Air Pollutants (NESHAPs), remain in place for pollutants such as asbestos, benzene, arsenic, and mercury.

Passage of the 1990 CAAA renewed emphasis on controlling emissions of air toxics at the federal level, and later would have a direct impact on air quality in Mecklenburg County. With the amendments, EPA changed its method of regulating HAPs to an approach based on the

implementation of existing emission control technology. Congress provided EPA with a list of 1891 compounds it deemed hazardous and required EPA to establish NESHAPs for industrial sectors emitting those pollutants. These industrial sectors, or “source categories,” had to include major sources emitting 10 tons/year of any one, or 25 tons/year of any combination of HAPs, and area sources (smaller sources, such as dry cleaners).

In the first regulatory phase of the new air toxics program, the CAAA required two types of emission standards for promulgation: maximum achievable control technologies (MACTs) and generally available control technologies (GACTs). MACTs are emission standards that achieve the maximum degree of reduction in emissions of the hazardous air pollutants. MACT is determined differently for new and existing sources of HAPs. For new sources, MACT is equivalent to the best controlled similar source in a given industry. For existing sources, MACT represents the average emission limit achieved by the best performing 12 percent of existing sources for which EPA has information. GACTs are less stringent emission standards based on the use of more standard technologies and work practices. After EPA issued MACT or GACT emission standards for a certain source category, sources had up to three years to come into compliance.

In the second regulatory phase of the air toxics program, EPA was instructed to conduct an assessment of, and report on, the residual risk due to HAPs likely to remain after implementation of the MACT and GACT standards. The goal of the residual risk assessment is to ensure that an ample margin of safety is provided by the emission standards to protect public health and the environment. Based on this assessment, EPA possibly would implement additional standards to address any significant remaining health or environmental risks.

Since 1990, EPA has promulgated MACT standards for all 94 major source categories and 16 area source categories. Work continues on the development and promulgation of new MACT or GACT standards for more area source categories. Today in Mecklenburg County, federal air toxics control requirements apply to 6 different major sources and more than 100 area sources. The facilities affected come from 17 unique source categories including Printing and Publishing, Magnetic Tape Surface Coating, Chromium Electroplating, and Drycleaners. These facilities have taken action to reduce HAP emissions by upgrading control equipment, substituting raw materials, and/or improving work practices. Many more area source facilities will be required to reduce HAP emissions as new standards for source categories such as Gasoline Stage I

Distribution and Autobody Refinishing Paint Shops are promulgated. Additional air toxic reductions are possible through the North Carolina local program as MACT promulgation date affects applicability of our local air toxic rules.

In summary, federal efforts to control air toxics have had a direct impact on the air we breathe in Mecklenburg County. MACT and GACT standards have helped ensure that the best emission control techniques and production practices from across the country are in place locally. As EPA continues its focus on area sources, and completes a review of residual risk, additional HAP reductions become possible.

¹ EPA's list of 189 HAPs was amended in 1996 and 2005. Today's list includes 187 chemicals.

National Emission Standards for Hazardous Air Pollutants (NESHAPs)

Source Categories Affected In Mecklenburg County (as of 1/1/2008)

Source Category	# of facilities in Meck Co.
Dry Cleaning	94
Chromium Electroplating	4
Magnetic Tape (surface coating)	2
Organic Liquids Distribution	2
Printing and Publishing (surface coating)	2
Commercial Sterilizers	1
Fabric Printing, Coating & Dyeing	1
Flexible Polyurethane Foam Fabrication Operation	1
Hazardous Organic NESHAP	1
Misc. Metal Parts and Products (surface coating)	1
Misc. Organic Chemical Production and Processes	1
Paper and Other Web (surface coating)	1
Polymers & Resins	1
Reinforced Plastic Composites Production	1
Rubber Tire Manufacturing	1
Tetrahydrobenzaldehyde Manufacture	1
Wood Furniture (surface coating)	1

Local Air Toxics Program

By S. David Ross, Sr. Air Quality Specialist
Mecklenburg County Air Quality

As the U.S. Environmental Protection Agency (EPA) was developing ways to protect public health from specific pollutants beyond the broad class of ozone precursor volatile organic compounds (also known as hydrocarbons or solvents) and particulates (also known as dust), they were torn between developing a program based on the latest technology, or looking at the public health impact of communities surrounding pollution sources. The EPA initially decided to develop a technology-based program, and asked the states to develop a community health-based program.

In the very late 1980s, the State of North Carolina began assessing the health risks from various air toxics. The original toxics program proposals were based on a factored approach using only the threshold limit values (TLVs) developed by the American Conference of Governmental Industrial Hygienists (ACGIH) for worker exposure. This was superseded by using a risk assessment approach developed by the North Carolina Academy of Sciences. It was this last technique that was incorporated into the rules, and still is in use today.

There are two parts to the North Carolina toxics regulation. The toxics screening levels, or *de minimis* levels, are modeling based. Any emissions above those thresholds require site specific modeling to determine compliance with the acceptable ambient levels (AALs), which is concentration based, at or beyond the property line. These AALs are designed to protect the general public. If the modeling demonstrated that an AAL is being exceeded, the facility has to take actions to reduce the emissions.

The models used to determine the total impact are computer programs that consider the location of the pollution sources, distance to where people could be affected by the pollution, and the weather. In order to determine the *de minimis* levels, a very conservative model considered a single emission source very close to where people could be, and the worst meteorological condition. The models used to demonstrate compliance with the AALs are less conservative, and more realistic. The AAL compliance models use real temperature and wind information for the Charlotte area, and are updated as the science is improved.

Among 219 existing permitted facilities in Mecklenburg County, 165 facilities have been evaluated by Mecklenburg County Air Quality (MCAQ) for compliance with the Air Toxics regulations. As facilities became subject to the state and federal toxic regulations, most were required to take emission reduction measures to comply, such as product reformulation, process modification, or emission control equipment installation.

Since 1994, MCAQ conducts a countywide air toxics emission inventory periodically. The last inventory was conducted for calendar year 2005. The data indicated the toxics emissions downward trend from 1994 to 2005. The inventory data also was useful to identify significant toxic emission sources that had not been subject to the toxic regulatory requirement. MCAQ has sent voluntary toxics compliance demonstration requests to 22 facilities. After taking various control measures, all of them could comply with the local regulations.

The Asbestos NESHAP In Mecklenburg County: A 20-Year Overview

*By Rick Nelson, Air Quality Specialist
Mecklenburg County Air Quality*

The Asbestos National Emission Standard for Hazardous Air Pollutants (NESHAP) is a federal air quality regulation set by the USEPA in 1973 under the authority of the Clean Air Act (CAA) of 1970. The CAA was made law to regulate hazardous air pollutants which may cause or contribute to an increase in mortality or an increase in severe irreversible or incapacitating reversible illness. The purpose of the asbestos NESHAP was to protect the public from exposure to asbestos in the ambient air by controlling and minimizing emissions of asbestos to the environment from:

- Asbestos mills and the disposal of mill waste;
- Use of asbestos tailings or waste in roadways;
- Manufacturing and fabricating operations;
- Spray application of asbestos and the use of molded and wet-applied asbestos insulation;
- Demolitions and renovations;
- Asbestos waste disposal and active and inactive waste disposal sites.

As a result of the adoption of the Mecklenburg County Air Pollution Control Ordinance (MCAPCO), including the asbestos NESHAP, by the Mecklenburg County Board of Commissioners in 1985, Mecklenburg County Air Quality (MCAQ) began to regulate demolitions and renovations and the collection, processing, packaging, and transportation of asbestos-containing waste materials (ACWM) under the asbestos NESHAP regulation.

In 1987, there were five stationary sources in Mecklenburg County engaged in the manufacturing and fabrication of products containing asbestos — most were brake and clutch reliners or asbestos textile producers. Today, these facilities no longer are using asbestos in their operations, or the



Asbestos tiles from
an old building



Demolition site

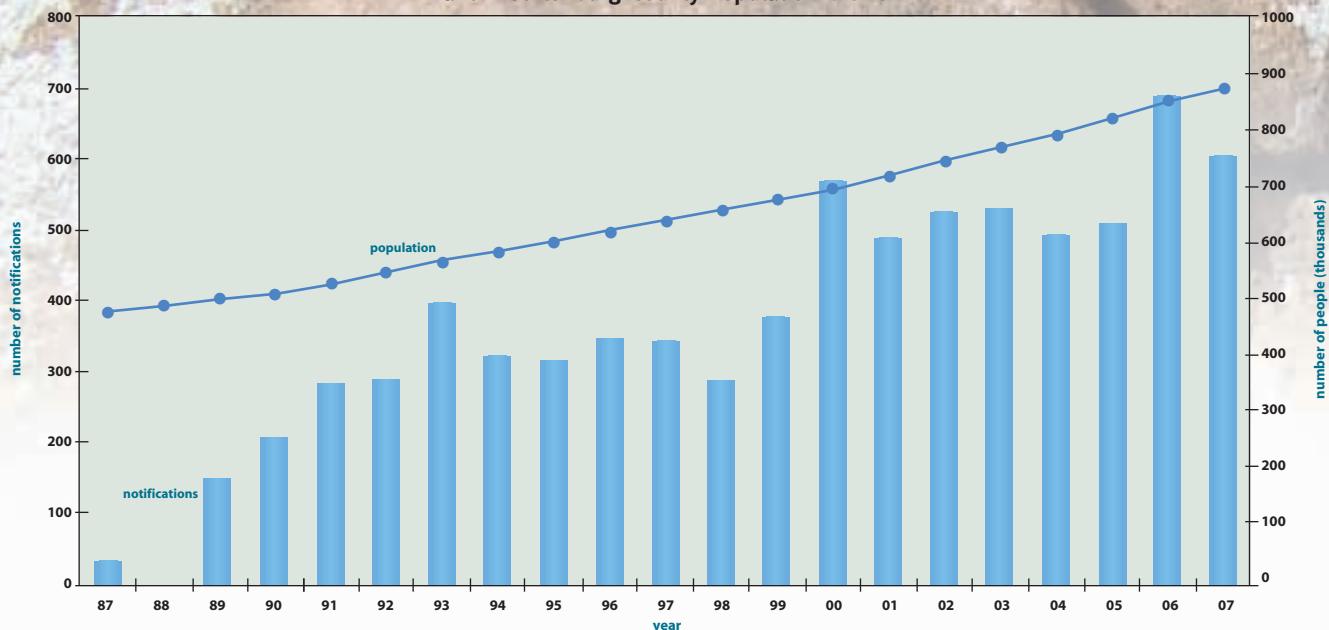
facilities have shut down. At least one such site, the former Southern Manufacturing plant in Charlotte, is being redeveloped into an arts and music-related center called the North Carolina Music Factory. This is being done as part of the North Carolina Brownfields Program, which is managed by the State Division of Solid Waste.

The growth of the city of Charlotte and other communities in Mecklenburg County has resulted in an increasing volume of asbestos NESHAP notifications for demolition and renovation from 1987 to the present (see Figure 1 on page 40). In 1987, when MCAQ began administering the asbestos NESHAP program, 33 notifications for demolition and renovation of buildings were submitted to

Asbestos continued on page 40

**Number of NESHAP Notifications
and Mecklenburg County Population Growth**

Figure 1



Asbestos continued from page 39

MCAQ in accordance with the regulation. At that time, commercial building demolitions and renovations were the main focus of the asbestos NESHAP program because the asbestos NESHAP excludes single residential buildings from the requirements of the regulation. Then much of the land being used for new development was generally rural.

Today, the number of NESHAP notifications has grown to 684 in 2006 and an estimated 600 notifications in 2007. In the last five years particularly, with the availability of large land tracts shrinking, developers have begun buying and combining individual adjoining land parcels to create the larger tracts needed for new development. When the land is cleared for new construction, the demolition of the residential buildings on the combined parcels is an activity that is subject to the asbestos NESHAP rules. This has resulted in residential demolitions becoming an increasingly larger percentage of the NESHAP notifications received.

Since 1987, several large residential apartment and housing complexes have been demolished to make way for new commercial and residential development. Since many of these were built in the 1940 through 1960, most had at

least some asbestos-containing material (ACM) that was required to be removed prior to demolition. In 1995-1998, the old Earle Village, a total of 409 housing units in Charlotte's First Ward, was razed and reborn as the mixed-use and mixed-income neighborhood now known as the Garden District. More recently, Belvedere Homes, Mayfield Terrace/Pitts Drive Apartments, Piedmont Courts, Westwood Apartments, Villa Heights Apartments, and Morningside Apartments, a total of 236 multiple housing unit buildings, were razed for new commercial and residential development.

In the last decade, several public projects have added significantly to the number of demolitions subject to the NESHAP regulation. These have been associated with the Charlotte Area Transit System (CATS), Charlotte-Mecklenburg Storm Water Services, Mecklenburg County Department of Parks and Recreation, and the Charlotte-Douglas International Airport.

The CATS Light Rail Line construction required many commercial and residential buildings along South Boulevard and adjoining areas to be demolished for the rail facility and various stations. This project has resulted in many other demolitions along the rail line as

Why Is Asbestos a Concern?

Asbestos is the common name for a group of naturally occurring silicate minerals that separate into strong fibers having exceptional thermal and electrical insulating properties. They are so small (the same size range as most bacteria) that individual asbestos fibers cannot be seen without the aid of a microscope, and are easily inhaled into the lungs. Acute symptoms of exposure are minimal, and asbestos-related diseases have a long latency period, typically 15-30 years. Asbestos-related diseases are progressive, disabling, and often fatal, and include asbestosis (lung tissue inflammation, scarring, fibrosis, and impaired breathing), lung cancer, and mesothelioma (cancer of the chest cavity lining).

EPA considers asbestos exposure such a threat that it has pursued banning most uses of asbestos. A rule published July 12, 1989, banned most applications of asbestos, only to

be overturned by the Fifth Circuit Court of Appeals in October 1991; however, the court did maintain the ban on certain uses of asbestos, such as in textured ceiling spray and sprayed-on fireproofing for structural support beams.

The best advice is to take appropriate steps to minimize the likelihood of asbestos exposure. There are still no regulations that require removal of asbestos containing materials unless the structures are being demolished or renovated. Asbestos-Containing Materials (ACM) that are in good condition and are not sanded or sawed are often better left in place and perhaps covered over for additional stability and protection. EPA recommends a proactive established management program with removal of the ACM occurring only if in poor condition, or when likely to release asbestos fibers as a result of some type of activity.

developers move forward with new transit-friendly commercial and residential projects. The South Boulevard Lowe's store and the associated mixed residential and retail district is one example that required 29 residential and commercial building demolitions.

The Mecklenburg County Storm Water program to purchase and remove flood prone commercial and residential buildings from flood plains and the joint Charlotte-Mecklenburg Storm Water and Mecklenburg County Department of Parks and Recreation program for restoring Charlotte creeks to their natural habitat and adding greenways have resulted in many demolitions of structures in those areas. In 2001, the Mecklenburg County Storm Water Floodplain Project resulted in the demolition of 112 homes. In 2007, Mecklenburg County began "uncapping" the Little Sugar Creek in the old Midtown Square area by demolishing the concrete caps that about 40 years ago were installed to enclose the creek and allow it to be paved over for parking and business development. Mecklenburg County Department of Parks and Recreation also demolished 26 buildings in the Lincoln Heights area for the construction of a new park.

The Charlotte-Douglas International Airport expansion project over the last five years has required at least 34 commercial and residential buildings being demolished to the west and south of the airport for new runway construction and for additional parking. In addition, the City of Charlotte has purchased and demolished structures around the airport that were subject to the substantial noise during take-off and landing of aircraft.

At the same time as the aforementioned public projects were taking place, a number of private projects in the public interest also were taking place. These include expansions of local hospitals and colleges. The Charlotte-Mecklenburg Housing Partnership, Inc demolished 25 buildings in the Druid Hills area for urban renewal.

There are still many structures in Mecklenburg County that have substantial quantities of ACM as part of the building materials and insulation used in their construction. The asbestos NESHAP, while an old regulation, is still in force to require elimination of ACM for demolition and renovation activities which may result in substantial asbestos emissions to the air. Mecklenburg County residents are safer from the health effects of asbestos because of the MCAQ asbestos NESHAP program.

North Carolina Considers Actions to Address Climate Change

By S. Sean Garner, R.S., Air Quality Specialist
Mecklenburg County Air Quality

Looking back to 1987, one can find many environmental areas of concern that still are being addressed today; however, you would have to carefully sift through old newspapers and environmental reports to find any mention of global climate change. If you did find something, it most likely would be referred to by the public and media as “the greenhouse effect.” Now more appropriately called global climate change, this enhanced greenhouse effect is believed to cause a variation in the Earth’s global climate. climate change is caused by increased amounts of air pollutants such as carbon dioxide and methane called greenhouse gases.

The increase in greenhouse gas emissions, and their potential effects, has spurred concern from the public, and has prompted initial responses by local, state and federal governments as well as some business and industry. North Carolina is one of the states taking a progressive approach toward climate change.

What is Climate Change?

The Earth absorbs energy from the sun, and radiates energy back into space. Much of the energy going back to space is absorbed by “greenhouse” gases (GHG) in the atmosphere and radiated back to the Earth’s surface warming it. Without the natural “greenhouse effect,” surface temperatures would be about 60° F lower. Conversely, an increase in greenhouse gases can cause temperatures to rise.

Expanding population growth and industrialized human activity in the past century has added to the amount of greenhouse gases in the atmosphere. The burning of fossil fuels to power our cars,

factories, and homes has added gases, primarily carbon dioxide and methane, to the atmosphere that enhance the natural greenhouse effect. The majority of the scientific community now believes that this increase is likely to contribute to an increase in global average temperature and related climate changes. climate change gained worldwide attention in 1997 with the Kyoto Protocol. Signing countries agreed to reduce greenhouse gas emissions by 55 percent of 1990 levels.

What is North Carolina Doing About Climate Change?

North Carolina has formed two groups to study climate change and propose approaches to address the problem. The North Carolina Climate Action Plan Advisory Group (CAPAG), a stakeholder group charged with recommending mitigation strategies to the North Carolina Division of Air Quality, began meeting in February 2006. The group developed recommendations in the areas of: residential, commercial, and industrial energy supply; transportation and land use; agriculture, forestry, and waste management; and cross-cutting issues.

CAPAG identified 56 options for further study and potential adoption that are believed to be most important for mitigating North Carolina’s GHG emissions. Some of these options include revising state energy codes, increasing use of biofuels like ethanol or biodiesel, and providing incentives to encourage the construction of more energy efficient buildings.

It is estimated that full adoption by the state of CAPAG’s recommendations would reduce North Carolina’s gross GHG emissions by approximately 47

percent, from 256 million metric tons of carbon dioxide equivalent (MMT_{CO2e}) to 137 MMT_{CO2e} by 2020, or within one percentage point of 1990 levels.

Also in 2006, the Legislative Commission on Global Climate Change (LCGCC) held its first meeting. The North Carolina General Assembly charged the Commission to determine, among other things, if a cap or limit on greenhouse gas emissions was warranted. If the commission found that this was warranted, they were charged with determining the level at which the cap should be set.

Many of the strategies that the LCGCC had identified focus on energy production, consumption, and management. Considering that three megawatt-hours of electricity generates more than two tons of GHG in the electric grid that services this area, it is clear that energy production plays an important role. North Carolina is looking at energy management, alternative fuels, and renewable energy to address climate change as well as energy supply concerns, but no definitive plans have been made.

Along with the aforementioned groups, the North Carolina Utilities Commission responded to a request by the Environmental Review Commission (ERC) of the North Carolina General Assembly to undertake a study of the potential costs and benefits of enacting a Renewable Energy Portfolio Standard (REP) in this state in February 2006, which is in line with recommendations by CAPAG. On August 20, 2007, North Carolina became the first state in the Southeast to adopt a REPS.

Under this new law, investor-owned utilities in North Carolina will be required to meet up to 12.5 percent of their energy needs through renewable energy resources or energy efficiency measures. Rural electric cooperatives and municipal electric suppliers are subject to a 10 percent REPS requirement. Renewable energy effectively utilizes natural resources such as sunlight, wind, tides and geothermal heat, which are naturally replenished. Renewable energy technologies range from solar power, wind power, and hydroelectricity to biomass and biofuels for transportation. Shifting electric

production from fossil fuels will reduce GHG produced by an estimated 15 million tons a year.

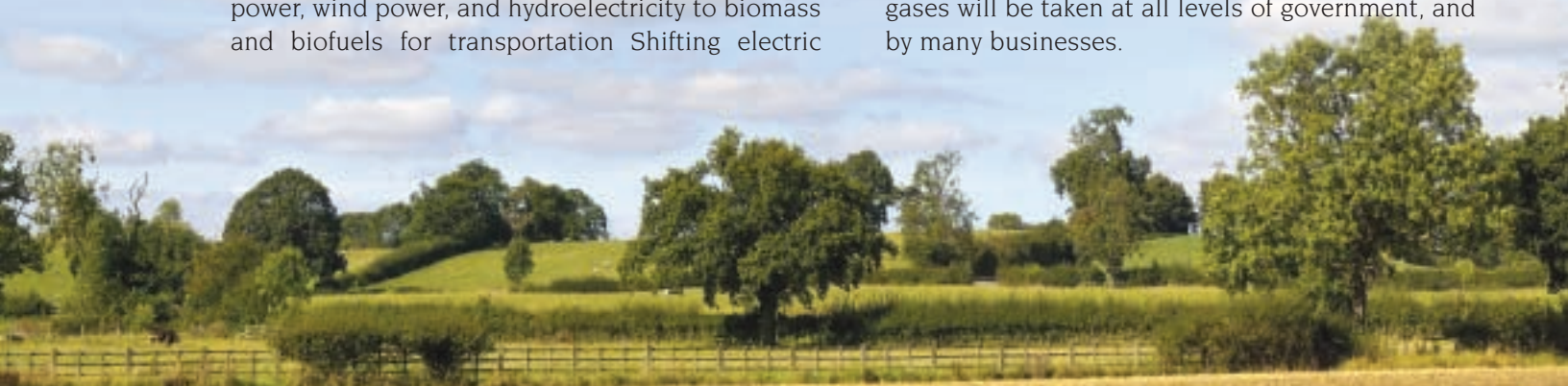
Electric power suppliers generally may comply with the REPS requirement in a number of ways, including:

- the use of renewable fuels in existing electric generating facilities,
- the generation of power at new renewable energy facilities,
- the purchase of power from renewable energy facilities,
- the purchase of renewable energy certificates, or
- the implementation of energy efficiency measures.

North Carolina continues to move forward addressing climate change with a variety of techniques. The progressive approach seeks to improve our environment while encouraging growth in new areas, and improve energy efficiency in existing business and industry.

Both Mecklenburg County Government and the City of Charlotte are making the first step toward taking action to reduce greenhouse gases by completing operational greenhouse gas inventories. This inventory process estimates the amount of carbon dioxide, methane and other greenhouse gases produced by government operations. Mecklenburg County will evaluate the contribution from energy usage in County-owned buildings, vehicles, and off-road equipment. Once completed, the inventory will help highlight opportunities for pollution reduction, and allow for tracking improvements due to environmental leadership initiatives, including the Energy Management Plan and the activities that are in place to purchase cleaner cars and equipment.

While climate change is only beginning to be addressed through regulations, there is certainly an expectation that more action to reduce greenhouse gases will be taken at all levels of government, and by many businesses.



Linking Land Use, Transportation, and Air Quality in Mecklenburg County

*By Leslie Rhodes, Mobile Source Program Manager
Mecklenburg County Air Quality*

The Link

With 90 percent of ozone-forming pollution and fine particulate matter coming from cars, trucks and things that move, understanding the connection between land use, transportation, and air quality is critical to future efforts to improve the air quality in Mecklenburg County. How we arrange the places where people live, work, and play affects how they choose to get there and how far they must travel to get there. It is easy to see this link between land use and transportation. What most people miss is how this connects to air quality. The more miles traveled in an automobile, the more air pollution that is generated. Even if the most convenient mode of transportation continues to be the automobile, effective land use and transportation planning can result in shorter trips in the car which, in turn, lowers air pollution. Land use and transportation infrastructure can either work to create dependency on motor vehicles or serve to promote and encourage alternate forms of transportation such as walking, biking, or taking transit. By creating access to attractive alternatives to driving, we can encourage citizens to travel to their desired destinations without creating as much air pollution.

While land use and transportation planning is a very long-term strategy to address air pollution, most urban communities agree that it is essential for management of growth and preservation of natural resources. In the City of Charlotte and Mecklenburg County, we can see evidence of at least three strategies that are expected to effect travel activity and work to control automobile pollution in the future, thus recognizing the link between land use, transportation, and air quality. These activities include:

- ① increasing density of development in appropriate areas,
- ② creating an accessible transit system, and
- ③ promoting a mix of land uses within an area.

Density

Density is the compactness of an area such as the amount of residential dwellings per acre of land. The 2015 Land Use Plan, adopted by the Mecklenburg County Board of Commissioners and the Charlotte City Council in 1997, laid out a “Centers and Corridors” approach to land use and transportation planning. This approach, as it is currently implemented through the City of Charlotte’s General Development Policies, promotes higher density development around existing and proposed transit stations, and along five major transit corridors. High density residential development in the area between the corridors, known as the “wedges,” is discouraged. It generally is accepted by air quality professionals that if dense development in the appropriate areas successfully is achieved, it can lead to a reduction in vehicle miles traveled and a reduction of air pollution from motor vehicles; however, the density alone will not make this goal a reality. The compactly developed area must be served by an accessible transit system.

Transit

When citizens choose to use transit, there are air quality benefits because multiple people traveling to the same area together in one vehicle greatly reduce the total number of miles driven. The 2025 Corridor System Plan adopted by the Charlotte area’s Metropolitan Transit Commission outlines a strategy for providing transit solutions that meets the land use objectives and mobility needs along each of the five corridors. If successful, land use plans create density in certain areas so that transit is a viable option, and likewise, transit serves the most, dense areas so that encouraging

dense development is a viable strategy. These two must work together in order to see air quality benefits in the future.

Mix of Land Uses

The densely developed areas served by transit must contain a mixture of uses in order to meet the needs of the citizens and reduce their need to travel long distances frequently. The “Centers and Corridors” approach encourages co-location of residential, office, service-oriented, retail and civic uses that are transit supportive. This arrangement of land uses promotes walking, biking, or shorter automobile trips.

In summary, understanding the connection between transportation and land use is a key to reducing the dependency of our citizens on the automobile. This in turn benefits air quality by

reducing pollution. While it can take decades to realize the effects of these efforts, most air quality experts agree that this is one of the pieces of the puzzle that must be in place to protect public health in the future. The current transportation and land use planning efforts in Mecklenburg County are consistent with nationally recognized strategies to connect transportation, land use, and air quality.

- When desired destinations are well arranged to reduce the miles traveled in an automobile to reach them, air pollution is reduced.
- A “Centers and Corridors” Plan in Mecklenburg County can reap air quality benefits.
- Land uses that encourage transportation alternatives such as walking, biking and taking transit benefit air quality by reducing automobile pollution



Air Quality Enforcement: An Education

*By Jimmy Pascal, R. S., Retired, Air Quality Specialist
Mecklenburg County Air Quality*

When the Clean Air Act of 1970 (CAA) became law, the means to enforce the law also were created. These means only were enforceable through court actions, and were considered misdemeanor violations at the worst. Industry quickly responded to these enforcement actions by considering court actions and penalties a routine cost of doing business. Little effort, time, or funds were provided by industry for reducing air pollution from their facilities. It became obvious to Congress that a law with easier enforcement and harsher penalties was required if the nation really wanted cleaner air.

The Clean Air Act Amendments of 1990 (CAAA) took air pollution enforcement seriously and addressed CAA deficiencies. Today, violations of the CAA now can be addressed by issuing Civil Penalties up to \$25,000 for each violation each day that the violation occurs. Also, if court actions are necessary, the violations are now considered felonies⁽¹⁾. It is not a joke for the person who signs environmental documents (permit applications, emission reports) to be referred to as the facility's "designated felon."

The CAAA allows citizen suits against persons, private corporations, or government agencies alleged to have violated emissions standards or permit requirements. It also provides for suits against the United States Environmental Protection Agency (EPA) in cases where the administrator of the EPA has failed to perform an action that is not optional under the CAA. Citizen groups have used this provision to compel the administrator to set regulations required by the law⁽²⁾.

The EPA and State of North Carolina delegated authority to Mecklenburg County Air Quality (MCAQ) to enforce the CAA. This delegation of authority allowed MCAQ to create the Mecklenburg County Air Pollution Control Ordinance, which is based upon the CAA and State of North Carolina's Air Quality regulations. When enforcement of MCAPCO is required, MCAQ normally sends a letter notifying the facility of a violation. This notice of violation requires that corrective action be taken by the facility. If the violation continues, is of a serious nature, or is repeated, a civil penalty may be assessed. The enforcement process for a violation escalates to an appeal to the Mecklenburg County Air Quality Commission (a citizen advisory board appointed by the Mecklenburg County Board of County Commissioners) or the courts.

MCAQ strives to serve the community not only as enforcement officers, but also as educators. Annual meetings, workshops, our Web site, and newsletters are produced to inform facilities of ordinance and permit requirements. These are just a few of the activities MCAQ conducts with the hopes of reducing enforcement actions. Facilities also have an assigned staff person from MCAQ, who is available to answer questions that might arise. The University of North Carolina's Charlotte campus has an Environmental Assistance Office that promotes air quality compliance. This office, partially funded by MCAQ, works with the facility under the stipulation they are not required to advise MCAQ of possible air quality concerns.

⁽¹⁾ Clean Air Act Amendments of 1990; Summary of Key Titles; Title VII

⁽²⁾ Clean Air Act: A Summary of the Act and Its Major Requirements; James E. McCarthy, Coordinator Specialist in Environmental Policy Resources, Science, and Industry Division; Congressional Research Service - The Library of Congress; Updated May 9, 2005

Adding Individual Actions Can Help Clear the Air

*By Alan Giles, Air Quality Specialist
Mecklenburg County Air Quality*

Twenty years ago, the State of the Environment Report listed Ozone attainment as a “high priority” issue for Mecklenburg County. Ozone attainment is still the most important health and environmental issue for this region in 2007, as this area again was designated by the United States Environmental Protection Agency (EPA) as “non-attainment” in 2004.

According to the North Carolina Division of Air Quality (NCDAQ) Sheila Holman, “None of the things that we look at from this point on are going to be easy to implement, and a lot of them will be disruptive to businesses and consumers.” Our continuing struggle with meeting the ozone standard can be directly related to the County’s population, which has almost doubled since 1987, and the vehicle miles traveled (VMT), which have tripled since 1985.

The area is working to reduce mobile source emissions at the local level. A Mobile Source group was established with Mecklenburg County Air Quality (MCAQ) in 2004 focusing on the reduction of mobile source pollution. Federal and state efforts are projected to bring us much closer if not all the way to attainment of the National Ambient Air Quality Standards; however, we believe that local action is still needed, and the community should be encouraged to contribute to the improvement of air quality. In addition to ozone non-attainment and a possible lowering of that standard by the EPA, we are also very close to the fine particulate standard for 2007; therefore, current efforts focus on reduction of nitrogen oxides, volatile organic compounds, and fine particulate matter. Mobile sources such as cars and trucks are the largest contributor of each of these pollutants

Industrial Controls continued on page 44



Industrial Controls continued from page 43

in Mecklenburg County. Reaching attainment will require a combination of both regulatory and aggressive voluntary actions.

According to the 2006 Mecklenburg County Community Survey, the number of people willing to use public transportation for their commute to work has increased by 5 percent since 2003, while willingness to use other commute actions, such as carpooling and vanpooling, have shown little change. There are several programs in this area which include emphasis on alternate commute behaviors and work to promote voluntary air pollution emission reduction actions through employers.

North Carolina Air Awareness

NC Air Awareness is a program that has been operated since 1997 in the non-attainment regions by NCDAQ. The goal of the program is to reduce air pollution through voluntary actions by individuals, employers and other organizations. The Charlotte Region's coordinator for Air Awareness promotes emission reductions through a business coalition encouraging actions from employees.

In 2007 there were 68 different organizations actively participating in the Air Awareness Business Coalition, and its efforts reached over 50,000 employees. All of the coalition partners distribute the air quality forecast on unhealthy days; however, most distribute it everyday during ozone season. Most of the coalition members are encouraging



actions to help improve air quality on Air Quality Action Days (days when air quality levels are predicted to be unhealthy).

Charlotte Area Transit

People seeking alternative transportation have increased ridership on Charlotte Area Transit (CATS) over the last nine years by more than 67 percent. CATS, transporting over 19 million passengers in 2007, operated 78 vanpools (an increase of 8.1 percent over 2006). More than 47 businesses in the Charlotte area participate in the CATS Employee Transportation Coordinator (ETC) program, which provides commute related services such as ride sharing, transit pass sales and other promotional activities to support this employer-based service.

In November, 2007 CATS opened the first rapid transit rail line in North Carolina. The LYNX Blue line in Charlotte is expected to carry 9,100 passengers each weekday during its first year of operation.

"Best Workplaces for Commuters"



The Best Workplaces for Commuters (BWC) is an EPA innovative, voluntary business-government program that distinguishes and provides national recognition to employers offering outstanding commuter benefits such as free or low cost bus passes, strong telework programs, carpool matching, and vanpool subsidies to reduce the number of employees that drive to work in single occupancy vehicles. Joining the BWC requires



participating employers to subsidize at least half of the employee transit cost. Several area businesses, including Duke Energy, Mecklenburg County Government, the Charlotte Chamber, the Centralina Council of Governments, and the City of Charlotte are members of BWC.

Clean Air Works!

This employer-focused Pilot Project was begun in 2006 and continued through 2007. Clean Air Works! is a project of the Regional Air Quality Board in collaboration with the City of Charlotte, Mecklenburg County Government, CATS, the Charlotte Chamber, the Centralina Council of Governments, and the Catawba Regional Council of Governments. The purpose of Clean Air Works! is to test what organizational approach and implementation elements and methods will produce quantifiable reductions in ozone-forming pollutants (chiefly nitrogen oxides) above those obtained through current efforts.

Clean Air Works! was successful in recruiting 89 partner companies in the eight county non-attainment region, reaching approximately 71,000 employees, and taking 78,000 trips off the road in 2007. All of this reduced more than 1.5 million miles traveled, and reduced 2,429 pounds of nitrogen oxides.

Clean Air Works! partners organized and hosted more than 150 worksite-based transportation events to encourage and educate employees



about commute related alternatives. Additionally, in 2007, many partners offered incentives for their employees to encourage employees to try commuting alternatives. Incentives included coverage of transit/vanpool costs, free lunch for employees not driving to lunch, and guaranteed ride home programs in case of emergency.

In addition to individual efforts to reduce air pollution through smart commuting choices, the quality of our air can also be improved due to energy conservation. By making environmentally-informed purchasing decisions, consumers can now contribute to the effort to reduce air pollution.

Reducing Energy Use

In 1992, EPA introduced ENERGY STAR as a voluntary labeling program designed to identify and promote energy-efficient products to reduce air pollution. The ENERGY STAR label now is on major appliances, office equipment, lighting, home electronics, and more. EPA also has extended the label to cover new homes and commercial and industrial buildings. Businesses, organizations, and consumers saved about \$14 billion in 2006 alone by choosing ENERGY STAR-labeled products.



The Change a Light, Change the World Campaign, sponsored by ENERGY STAR, is designed to encourage a switch from incandescent light bulbs to compact fluorescent lighting, which has earned the government's ENERGY STAR label for energy efficiency. Going into its 8th year, individuals are invited to take the online ENERGY STAR Change a Light Pledge, where they can commit to change-out at least one light at home.

Mecklenburg County Air Quality participated in Change a Light Day in 2006 by offering Compact Fluorescent Lights (CFLs) for purchase. The County sold 795 CFLs at this event preventing 40 tons of greenhouse gas pollution. The County has held five Change a Light events in 2007 at various County office locations as well as some Clean Air Works! locations. The results of those efforts are 1,305 CFLs sold and 75 tons of greenhouse gas pollution prevented.

In conclusion, although the past 20 years have seen considerable improvements in industrial air pollution controls, the solution for the next 20 years must include much needed pollution reductions from individual actions.

Mecklenburg County's Water Quality Program has converted 60 of their 73 automated monitoring stations to solar power. That's more than 82 percent of the stations. These stations have solar panels that keep a car battery charged to run the monitoring station, cell phone and modem. If the car battery didn't wear out, these stations would operate with a neverending, emission-free power supply.

Mecklenburg County's Fleet Management Division maintains 1,149 vehicles. Of these, 20 are hybrids, which means the engine charges a larger battery than most cars have, and the engine operates off that battery for periods of time such as when the car is idling. When non-hybrids idle, that is the time when they emit the most air pollution. The County purchased its first hybrid, a Toyota Prius, for the Air Quality Program in 2001.